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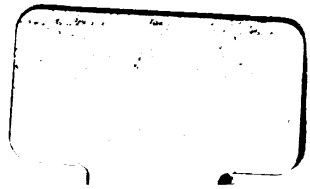

E. V. Huntington.

FIVE-PLACE LOGARITHMIC AND TRIGONOMETRIC TABLES

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PREFACE

The editor's aim in these tables has been to secure an open and attractive page, an arrangement easily understood but not involving needless repetitions, and some simple device by which any required data in the table can be quickly found. By lessening the time and weariness involved in using logarithmic tables, it is hoped that logarithmic computation will be encouraged and made more attractive to the beginner.

These tables are intended primarily for those who use logarithmic and trigonometric tables for the first time. The editor believes that clearness of comprehension of the tables by beginners is promoted by retaining the decimal point before mantissas and by tabulating the exact characteristics of the trigonometric functions. In § 6, simple rules are given for the characteristics of the logarithmic functions of angles between 6° and 84°. The computer should apply these fundamental rules so that when the given angle is between these limits he will seek only the mantissas of its functions in the table, and will know at once the relation of an angle to 45° from the characteristic of its logarithmic tangent or cotangent. Moreover, these rules are useful as simple checks.

In Tables III and IV characteristics are written only at the top and the bottom of each column of mantissas. Even these are superfluous when the angle is between 6° and 84°. In Tables I, III, and IV the first two figures of a mantissa are written only in the first mantissa having these figures and in the first mantissa of each group of five mantissas. This plan makes the printed figures stand out clear and distinct in an open page, greatly aids the eye in following either rows or columns, and practically reduces groups of five mantissas to groups of four. In using such tables the student is not fatigued through the strain and confusion incident to consulting pages crowded with needlessly repeated figures.

To enable the computer to find at once the page or the part of a page on which any given datum is tabulated, each table is provided with a system of tabs. The explanation of these tabs in §§ 10–13 will contribute to the better understanding of the tables themselves, and their use will lead the student to a method in his work and enable him to find any desired data in the tables in less than half the time usually required.

JAMES M. TAYLOR

COLGATE UNIVERSITY, December, 1905

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EXPLANATION OF TABLES

TABLE I

1. Table I contains five-place mantissas of the common logarithms of all entire numbers from 1 to 11,000. Mantissas can be expressed only approximately, and in a five-place table all the figures which follow the fifth are rejected, the fifth being increased by 1 whenever the sixth figure is 5 or more.

When, after the fifth figure has been increased, the last *significant* figure in a mantissa is 5, it is printed with a bar under it. Hence in the fifth place $\underline{5}$ indicates that the fifth figure was 4 and the sixth 5 or more; in the fourth place $\underline{5}$ indicates that the fourth figure was 4, the fifth 9, and the sixth 5 or more; and so on.

When their place is blank the first two figures of any mantissa are the two figures *first above* the blank space.

NOTE. For brevity in the following pages we shall call the *decimal part of the logarithm* of a number the *mantissa* of the number, and the *integral part of the logarithm* the *characteristic* of the number.

2. *To find from the table the mantissa of any whole number.*

We have the two following cases.

(*a*) When the given number is less than 11,000, that is, when the number is in the table.

E.g., let the number be 7423. On page 14, in the column headed "N," we find the first three figures, 742; passing along this *line* or *row* to the *column* with the fourth figure, 3, at its top, we find .87058, which is the mantissa of 7423.

Thus the first three figures of a number of four figures give the *row*, and the fourth figure gives the *column* in which the mantissa is found.

When the number is one of less than four figures, by adding one or more ciphers we obtain a number of four figures whose mantissa is the same as that of the given number.

E.g., the mantissa of 59 = the mantissa of 5900 = .77085.

To save time in finding the mantissa of a number of one or two figures, the mantissa of each whole number from 1 to 100 is given on page 1 in the column headed "M," at the right of the number itself in the column headed "N."

Ex. 1. Find log 8300 and log 0.00083.

The characteristic of 8300 is $+3$, and that of 0.00083 is $\bar{4}$, or $6 - 10$.
The mantissa of 8300 or 0.00083 is the same as the mantissa of 83.
The mantissa of 83 = .91908.
Hence $\log 8300 = 3.91908$,
and $\log 0.00083 = \bar{4}.91908$, or $6.91908 - 10$.

If the number lies between 10,000 and 11,000, its mantissa will be found on page 20 or 21. Here the first *four* figures of the number give the *row*, and the *fifth* figure gives the *column* in which the mantissa is found.

E.g., the mantissa of 10315 = .01347.

NOTE. For the explanation of the marginal tabs of Table I see § 10.

Ex. 2. Verify each of the following identities:

$\log 4354 = 3.63889$; $\log 62.81 = 1.79803$; $\log 37.96 = 1.57933$;
$\log 945.8 = 2.97580$; $\log 0.749 = \bar{1}.87448$; $\log 10.327 = 1.01397$.

(*b*) When the given number is greater than 11,000, that is, when the number is not in the table.

In this case we assume that *any small increase in a number is proportional to the corresponding increase in its mantissa.*

This assumption, though not mathematically exact, is sufficiently correct for *interpolation* within narrow limits.

E.g., let the number be 54376.
The mantissa of 54376 = the mantissa of 5437.6.
For convenience we put, or conceive, a decimal point after the fourth figure.

The mantissa of 5438 = .73544
The mantissa of 5437 = .73536
Hence the *tabular difference* = .00008

That is, for an increase of 1 in the number 5437 there is an increase in the mantissa of 8 hundred-thousandths, or 8 points, as we may say for brevity. Hence for an increase of .6 in the number there will be an increase in the mantissa of .6 of 8 points, or 5 points nearly.
Hence the mantissa of 5437.6 = .73536 + .00005 = .73541.
Therefore the mantissa of 54376 = .73541.

Ex. 3. Find log 27.583.

The characteristic is 1, and the mantissa is that of 2758.3.

The mantissa of 2758 = .44059
The increase for .3 = .3 of 16 points = 5
$\therefore \log 27.283 = 1.44064$

The increase for .3 is often called the *correction* for .3.

By aid of the marginal difference table this computation can easily be made mentally. *E.g.*, the mantissa of 2758 is .44059, and the tabular difference is 16 points. In the marginal table headed **16**, in line 3, we find 5, which is .3 of 16.

Ex. 4. Verify each of the following identities:

$$\log 92.378 = 1.96557; \quad \log 0.034796 = \bar{2}.54153;$$
$$\log 23.804 = 1.37665; \quad \log 0.0030975 = \bar{3}.49101;$$
$$\log 0.67857 = \bar{1}.83159; \quad \log 0.075809 = \bar{2}.87972.$$

3. *To find a number when its logarithm is given.*

Keep in mind that the *mantissa* determines the *figures* and their *order* in the expression of a number, while the *characteristic* determines *unit's place.*

Observe that the least and greatest mantissa on each page is written at the bottom of the page.

We have the two following cases.

(*a*) When the given mantissa is in the table.

Ex. 1. Given $\log x = 2.68269$, to find the value of x.

On page 9 we find the mantissa .68269 in row 481 and in column 6; hence .68269 is the mantissa of 4816. Since the characteristic is 2, we have

$$x = 481.6.$$

Similarly if $\log x = \bar{2}.68269$, $x = 0.04816$.

Observe that the first mantissa which is .68 + or .69 + has its first two figures in black type; this is to aid in locating on the page any mantissa which is between .68 and .69.

Ex. 2. Find the value of x in each of the following equations:

$$\log x = 3.63889; \quad \log x = 1.79803; \quad \log x = 1.57933;$$
$$\log x = 2.97580; \quad \log x = \bar{1}.87448; \quad \log x = 1.01397.$$

For the answers see example 2 in § 2.

(*b*) When the given mantissa is not in the table.

Ex. 3. Given $\log x = 2.28250$, to find the value of x.

On page 3 we find that of tabulated mantissas the next less than .28250 is .28240, which is the mantissa of 1916.

The tabular difference is 22 points.

The given mantissa exceeds the next less mantissa by 10 points.

Hence 1916 should be increased by $\frac{10}{22}$ of 1, or 0.5 approximately.

That is, .28250 is the mantissa of 1916.5 or 19165.

Since the characteristic is 2, we have $x = 191.65$.

Ex. 4. Given $\log x = \bar{1}.03720$, to find x to six places.

When the mantissa is less than .04175, we use pages 20 and 21.

The next less mantissa is .03719, mantissa of 10894.

The tabular difference is 4; hence the correction is $\frac{1}{4}$ of 1, or .3.
Hence $x = 0.108943$.
If only five places were required, interpolation would be unnecessary.

Ex. 5. Given $\log x = -1.23457$, to find x.

Here $\log x$ is not in the *type form*; -1 is not the characteristic nor is $-.23457$ the mantissa. To put $\log x$ in the type form we add 0 in the form $-1+1$; we thus obtain

$$\log x = -2 + (1 - .23457) = \bar{2}.76543, \text{ or } 8.76543 - 10.$$
$$\therefore x = 0.058268.$$

Ex. 6. Find the value of x in each of the following equations:

$$\log x = 1.96557;\ \log x = \bar{1}.83159;\ \log x = \bar{3}.49101;$$
$$\log x = 1.37665;\ \log x = \bar{2}.54153;\ \log x = \bar{2}.87972.$$

For the answers see example 4 in § 2.

Ex. 7. Given $x = 432/5271$, to find x by logarithms.

Here
$$\log x = \log 432 - \log 5271.$$
$$\log 432 = 2.63548 = 12.63548 - 10$$
$$\log 5271 = \underline{3.72189}$$
$$\therefore \log x = 8.91359 - 10$$
$$\therefore x = 0.08196.$$

Observe that before we subtract we write the characteristic 2 in the form $12 - 10$, and thus make the *positive* part of the minuend greater than the *positive* part of the subtrahend.

Ex. 8. Given $x = \sqrt[4]{32.17 \times .00271}$, to find x by logarithms.

Here
$$\log x = (\log 32.17 + \log .00271)/4.$$
$$\log 32.17 = 1.50745$$
$$\log .00271 = \bar{3}.43297$$
$$\therefore \log x = \bar{2}.94042/4$$
$$= (38.94042 - 40)/4$$
$$= 9.73511 - 10, \text{ or } \bar{1}.73511.$$
$$\therefore x = 0.54339.$$

Note that before dividing by 4 we write the characteristic -2 in the form $38 - 40$, so that the negative part, -40, when divided by 4 gives -10 as a quotient.

TABLE II

4. This table contains the values and logarithms of some important constants and their combinations which most frequently occur. The table needs no explanation.

TABLE III

5. This table contains the logarithms of the sines, cosines, tangents, and cotangents of angles from 1° to 89° at intervals of 1′. If the angle is less than 45°, the number of degrees is found at the top of the page, the number of minutes in the *left-hand* minute column, and the name of the function at the *top*. If the angle is greater than 45°, the number of degrees is found at the bottom, the number of minutes in the *right-hand* minute column, and the name of the function at the *bottom*. The mantissa is in the same row as the number of minutes, and the characteristic is at the top or bottom of the column of mantissas. The characteristic at the top of any column is usually the same as that at the bottom; the only exceptions are found on pages 26 and 45, where the characteristic at the *top* of the column is to be taken with any mantissa *above* the *bar*, and the characteristic at the *bottom* is to be taken with any mantissa *below* the bar.

6. *To find from the table the logarithm of the sine, cosine, tangent, or cotangent of a given angle.*

This problem will be illustrated by special examples.

Ex. 1. Find log sin 35° 42′, *i.e.*, the logarithm of the sine of 35° 42′.

On page 41, under 35°, in the column *headed* "log sin" and in the row 42′, we find the mantissa .76607. The characteristic at the top of the column is $9 - 10$.

Hence $\log \sin 35° 42' = 9.76607 - 10$.

NOTE 1. We have $\sin 6° = \cos 84° > 0.1$,

and $\sin 90° = \cos 0° = 1$; hence:

(*a*) *The characteristic of the sine of any angle between* 6° *and* 90°, *or of the cosine of any angle between* 0° *and* 84°, *is* $9 - 10$.

Again, $\tan 6° = \cot 84° > 0.1$,

$\tan 45° = \cot 45° = 1$,

and $\tan 84° = \cot 6° < 10$; hence:

(*b*) *The characteristic of the tangent of any angle between* 6° *and* 45°, *or of the cotangent of any angle between* 45° *and* 84°, *is* $9 - 10$.

(*c*) *The characteristic of the cotangent of any angle between* 6° *and* 45°, *or of the tangent of any angle between* 45° *and* 84°, *is* 0.

By (*a*), (*b*), and (*c*) we know the characteristic of each function of any angle between 6° and 84°.

E.g., the characteristic of sin 80°, cos 25°, tan 35°, or cot 70° is $9 - 10$; and the characteristic of tan 65° or cot 42° is 0.

NOTE 2. For the explanation of the marginal tabs of Table III, see § 11.

Ex. 2. Verify each of the following identities:

$\log \tan 41° 32' = 9.94732 - 10$; $\log \cos 29° 18' = 9.94055 - 10$;
$\log \sin 68° 21' = 9.96823 - 10$; $\log \cot 28° 35' = 0.26373$;
$\log \tan 88° 35' = 1.60677$; $\log \cos 61° 27' = 9.67936 - 10$

Ex. 3. Find $\log \tan 32° 24' 33''$.

To interpolate for seconds, we assume that any *small increase in an angle is proportional to the corresponding increase or decrease in the logarithm of any function of the angle.*

$$\log \tan 32° 24' = 9.80251 - 10.$$

The tabular difference for 1′, or 60″, is 28 points.

Hence, if an increase of 60″ in the angle causes an increase of 28 points in the mantissa, an increase of 33″ in the angle will cause an increase of 33/60 of 28, or 15, points in the mantissa.

$$\therefore \log \tan 32° 24' 33'' = 9.80266 - 10.$$

Ex. 4. Find $\log \tan 81° 32' 14''$.

$$\log \tan 81° 32' = 0.82723.$$

The tabular difference for 60″ is 87 points.

Hence the *correction* for 14″ is $\frac{14}{60}$ of 87, or 20, points.

$$\therefore \log \tan 81° 32' 14'' = 0.82743.$$

Ex. 5. Find $\log \cos 38° 25' 17''$.

$$\log \cos 38° 25' = 9.89405 - 10.$$

The tabular difference for 60″ is 10 points.

Hence the *correction* for 17″ is $\frac{17}{60}$ of 10, or 3, points.

Since the cosine *decreases* as the angle increases, this correction is to be *subtracted.*

$$\therefore \log \cos 38° 25' 17'' = 9.89402 - 10.$$

Ex. 6. Find $\log \cot 84° 38' 13''$.

$$\log \cot 84° 38' = 8.97285 - 10.$$

Here we take the characteristic at the top of the page, since the mantissa is *above the bar.*

The tabular difference for 60″ is 135 points.

Hence the correction for 13″ is $\frac{13}{60}$ of 135, or 29, points.

$$\therefore \log \cot 84° 38' 13'' = 9.97256 - 10.$$

It must be kept in mind that when the angle *increases* the cosine or the cotangent *decreases;* hence the correction for seconds must be *subtracted* in finding the logarithm of the cosine or cotangent of an angle.

If an angle is less than 2° or greater than 88°, and involves seconds, consult Table IV.

Ex. 7. Verify each of the following identities:

$\log \sin 34° 9' 17'' = 9.74929 - 10$; $\log \sin 61° 56' 43'' = 9.94571 - 10$;
$\log \tan 42° 16' 41'' = 9.95867 - 10$; $\log \tan 78° 19' 31'' = 0.68481$;
$\log \cos 26° 17' 13'' = 9.95260 - 10$; $\log \cos 81° 51' 35'' = 9.15106 - 10$;
$\log \cot 25° 50' 20'' = 0.31492$; $\log \cot 84° 25' 30'' = 8.98950 - 10$.

7. *To find the value of an angle when the logarithm of its sine, cosine, tangent, or cotangent is given.*

Ex. 1. Given $\log \sin A = 9.48213 - 10$, to find a value of A.

On page 32, in column *headed* "log sin," under 17°, in row 40′, we find the given mantissa, the given characteristic being at the top of this column.

$$\therefore A = 17° 40'.$$

Observe that when the characteristic of $\sin A$ or $\cos A$ is -1, a mantissa less than .84949 is in a column *headed* "log sin," while a mantissa greater than .84949 is in a column *footed* "log sin."

When the characteristic of $\tan A$ or $\cot A$ is -1, the mantissa is in a column *headed* "log tan"; when the characteristic is 0, the mantissa is in a column *footed* "log tan."

When the characteristic of any function is $+1$ or -2, the angle is less than 6° or greater than 84°; hence we consult one of the first three pages of the table.

Ex. 2. Find the value of A in each of the following equations:

$\log \sin A = 9.96823 - 10$; $\log \tan A = 9.94732 - 10$;
$\log \cos A = 9.94055 - 10$; $\log \cot A = 0.26373$.

For the answers see example 2 in § 6.

Ex. 3. Given $\log \sin A = 9.93422 - 10$, to find the value of A.

The given mantissa is not found in the table.
The next less mantissa is .93420, mantissa of sin 59° 15′.
The tabular difference for 60″ is 7 points.
The given mantissa exceeds the next less by 2 points.
Hence the correction is $\frac{2}{7}$ of 60″, or 17″.

$$\therefore A = 59° 15' 17''.$$

Ex. 4. Given $\log \tan A = 0.46940$, to find the value of A.

The next less mantissa is .46922, mantissa of tan 71° 15′.
The tabular difference for 60″ is 41 points.
The given mantissa exceeds the next less by 18 points.
Hence the correction is $\frac{18}{41}$ of 60″, or 26″.

$$\therefore A = 71° 15' 26''.$$

Ex. 5. Given $\log \cos A = 9.56871 - 10$, to find the value of A.

The next less mantissa is .56854, mantissa of cos 68° 16′.
The tabular difference for 60″ is 32 points.

The given mantissa exceeds the next less by 17 points.
Hence the correction is $\frac{17}{34}$ of 60″, or 32″.
Since the angle decreases when the cosine increases, we subtract this correction from 68° 16′ and obtain

$$A = 68° 15′ 28″.$$

Ex. 6. Find the value of A in each of the following equations:

$\log \sin A = 9.74929 - 10$;	$\log \sin A = 9.94571 - 10$;
$\log \tan A = 9.95867 - 10$;	$\log \tan A = 0.68481$;
$\log \cos A = 9.95260 - 10$;	$\log \cos A = 9.15106 - 10$;
$\log \cot A = 0.31492$;	$\log \cot A = 8.98950 - 10$.

For the answers see example 7 in § 6.

TABLE IV

8. The first page of this table contains the logarithms of the sines of angles from 0° to 0° 3′ at intervals of 1″, or the logarithms of cosines of angles from 89° 57′ to 90°. Since within the limits of 0° and 3′, to five places of decimals, $\log \tan A = \log \sin A$, and within the limits of 89° 57′ and 90° $\log \cot A = \log \cos A$, any log sin on this page can be taken as log tan, and any log cos as log cot.

E.g., $\log \tan 0° 1′ 52″ = \log \sin 0° 1′ 52″ = 6.73479 - 10$;
and $\log \cot 89° 58′ 37″ = \log \cos 89° 58′ 37″ = 6.60465 - 10$.

The other pages of this table contain the logarithms of the sines, cosines, and tangents of angles from 3′ to 2° at intervals of 10″; also the logarithms of the sines, cosines, and cotangents of angles from 88° to 89° 57′ at intervals of 10″.

For the explanation of the marginal tabs see § 12.

Ex. Find $\log \sin 0° 50′ 25″$.
$\log \sin 0° 50′ 20″ = 8.16557 - 10$.
The tabular difference for 10″ is 143 points.
Hence the correction for 5″ is $\frac{5}{10}$ of 143, or 72, points.
$\therefore \log \sin 0° 50′ 25″ = 8.16629 - 10$.
Similarly $\log \cos 1° 48′ 35″ = 9.99978 - 10$.
Also $\log \tan 0° 46′ 32″ = 8.13152 - 10$. $\log \cot 88° 32′ 43″ = 8.40475 - 10$.

Any logarithmic tangent or cotangent found in this table is negative. Hence when $\log \tan A$ or $\log \cot A$ is positive, we use the relation $\log \cot A = -\log \tan A$ before consulting the table.

E.g., $\log \cot 0° 2′ 15″ = 0 - \log \tan 0° 2′ 15″$
$= (10 - 10) - (6.81591 - 10) = 3.18409$.
Again, if $\log \tan A = 2.35063$,
$\log \cot A = 10 - 2.35063 - 10 = 7.64937 - 10$.
$\therefore A = 89° 44′ 40″$.

TABLE V

9. This four-place table contains the natural sines, cosines, tangents, and cotangents of angles from 0° to 90° at intervals of 1′.

For the explanation of the marginal tabs see § 13.

Ex. 1. Verify each of the following identities:

$\sin 27° 42′ = 0.4648$; $\tan 72° 21′ = 3.1429$; $\sin 22° 3′ 22″ = 0.3755$;
$\cos 68° 43′ = 0.3630$; $\cot 82° 28′ = 0.1322$; $\tan 60° 4′ 38″ = 1.7375$.

Ex. 2. Find the value of A in each of the following equations:

$\sin A = 0.4648$; $\tan A = 3.1429$; $\sin A = 0.3755$;
$\cos A = 0.3630$; $\cot A = 0.1322$; $\tan A = 1.7375$.

Ex. 3. The bearing of a course is N. 25° 42′ E., and its length is 9.32 chains; find its latitude and departure to two decimal places.

$$\text{Latitude} = 9.32 \sin 25° 42′ = 9.32 \times 0.434 = 4.04 \text{ chains.}$$
$$\text{Departure} = 9.32 \cos 25° 42′ = 9.32 \times 0.901 = 8.40 \text{ chains.}$$

EXPLANATION OF MARGINAL TABS

10. TABLE I. The pupil should place his book of tables on his desk at his left, and in manipulating them use only his *left* hand. If he opens the tables with the projecting tab B, all the marginal tabs of Table I can be seen in the left-hand margin. Using the projecting tab A, he puts his forefinger under the first pages of the table, and placing his thumb on any marginal tab, as tab 5, he turns to the right the leaves not held between his thumb and finger, thus opening the table at the pages marked by the marginal tab 5. When thus opened it is found that the first figure on the marginal tab used is the first figure of every number found on the pages opened, that the mantissa on this tab is the least mantissa on these pages, and that the greatest mantissa on these pages is a little greater than the mantissa on the next tab *below.*

Hence, to find the pages needed when the number is given, *use the tab which has on it the first figure of the given number.*

To find the pages needed when the logarithm is given, *use the tab which has on it the mantissa next less than the given one.*

11. TABLE III. Open the book of tables with tab C, so that all the marginal tabs of Table III can be seen in the left-hand margin. Opening this table with any marginal tab, as tab 17° – 20°, we find that the number of degrees at the top of this tab are those at the tops of the pages opened, and that the numbers of degrees at the

bottom of this tab are those at the bottoms of these pages. The first mantissa on this tab is the least mantissa on these pages, in the columns *headed* "log sin," and the greatest mantissa in these columns is the first mantissa on the next tab *below*. The *second* mantissa on this tab is the least mantissa on these pages, in the columns *headed* "log tan," and the greatest mantissa in these columns is the *second* mantissa on the next tab *below*.

The *last* mantissa on this tab is the least mantissa on these pages, in the columns *footed* "log sin," and the greatest mantissa in these columns is the *last* mantissa on the next tab *above*.

The mantissa *next to the last* is the least mantissa on these pages in the columns *footed* "log tan," and the greatest mantissa in these columns is the corresponding mantissa on the next tab *above*. Hence:

To find the pages needed when the angle is given, *use the tab on which the number of degrees is written or included.*

To find the pages needed when log sin or log cos is given, and the characteristic is $9 - 10$, *use the tab whose first or last mantissa is the next less than the given one.*

To find the pages needed when log tan or log cot is given:

When the characteristic is $9 - 10$, *use the tab whose second mantissa is the next less than the given one.*

When the characteristic is 0, *use the tab whose mantissa next to the last is the next less than the given one.*

When the characteristic of any function is -2 or $+1$, look for the logarithm on one of the first three pages of the table.

On tab 41°–44° observe that the *last* mantissa is the greatest in the columns *headed* "log sin," as well as the least in the columns *footed* "log sin"; and that the mantissa next to the last is the greatest logarithm in the columns *headed* "log tan," as well as the least in the columns *footed* "log tan."

Where no characteristic is written before a mantissa on any tab, $\bar{1}$ is understood with the first, second, or fourth mantissa, and 0 with the third.

12. TABLE IV. To open the tables, use the projecting tab D. The first, the second, and the last logarithm on any marginal tab have the same meaning and use respectively as the first, the second, and the last logarithm on a tab in Table III.

Since the logarithmic tangents of angles between 88° and 90° are not recorded in this table, its tabs have no logarithm corresponding to the third logarithm on a tab in Table III.

13. TABLE V. To open the tables, use the projecting tab E.

To find the pages needed when the angle is given, use the marginal tab on which the name of the required function is written and the given number of degrees is written or included.

To find the pages needed when a function is given, use a tab on which the name of the given function is written and on which the first or the last function is the next less than the given one.

If this next less function is the *first* on the tab, the given function will be found in a column *headed* "sin" or "tan"; if it is the *last* on the tab, the given function will be found in a column *footed* "sin" or "tan."

14. TABLE VI. This table is to be used when greater accuracy is required than can be secured by interpolation in Table IV.

In it α = the *number* of seconds in an angle less than $2° 2'$,

$$S = \log(\sin \alpha''/\alpha) = \log \sin \alpha'' - \log \alpha, \quad (1)$$

$$T = \log(\tan \alpha''/\alpha) = \log \tan \alpha'' - \log \alpha. \quad (2)$$

From (1), $\log \sin \alpha''$ can be obtained from S and α, or α can be found from S and $\log \sin \alpha''$. From (2), $\log \tan \alpha''$ can be obtained from T and α, or α can be found from T and $\log \tan \alpha''$.

Ex. 1. Find $\log \sin 0° 42' 13''$.

$0° 42' 13'' = 2533'' = \alpha''$.

$\therefore \log \alpha = 3.40364$

$S = \underline{4.68556 - 10}$

$\therefore \log \sin \alpha'' = 8.08920 - 10$

Ex. 2. Find $\log \cos 88° 18' 21.2''$.

$\cos 88° 18' 21.2'' = \sin 1° 41' 38.8''$.

$1° 41' 38.8'' = 6098.8'' = \alpha''$.

$\therefore \log \alpha = 3.78525$

$S = \underline{4.68551 - 10}$

$\therefore \log \cos 88° 18' 21.2'' = 8.47076 - 10$

Ex. 3. Find $\log \tan 0° 58' 32.7''$.

$0° 58' 32.7'' = 3512.7'' = \alpha''$.

$\log \alpha = 3.54564$

$T = \underline{4.68562 - 10}$

$\therefore \log \tan \alpha'' = 8.23126 - 10$

Ex. 4. Find $\log \tan 89° 13' 34.22''$.

$\cot 89° 13' 34.22'' = \tan 46' 25.78''$.

$46' 25.78'' = 2785.78'' = \alpha''$.

$\therefore \log \alpha = 3.44495$

$T = \underline{4.68560 - 10}$

$\therefore \log \cot 89° 13' 34.22'' = 8.13055 - 10$

$\therefore \log \tan 89° 13' 34.22'' = 1.86945$.

Find A when there is given:

Ex. 5. $\log \sin A = 6.67237 - 10$.

Here $A < 2°$; hence we put

$\log \sin \alpha'' = 6.67237 - 10$

$S = \underline{4.68557 - 10}$

$\therefore \log \alpha = 1.98680$

$\therefore \alpha'' = 97.006''$

$= 1' 37.006''$.

Ex. 6. $\log \tan A = 2.35427$.

Let $\log \tan \alpha'' = \log \cot A$; then

$\log \tan \alpha'' = 7.64573 - 10$

$T = \underline{4.68558 - 10}$

$\therefore \log \alpha = 2.96015$

$\therefore \alpha'' = 912.32'' = 15' 12.32''$.

$\therefore A = 90° - \alpha'' = 89° 44' 47.68''$.

TABLE I

FIVE-PLACE MANTISSAS

OF THE

COMMON LOGARITHMS

OF THE

ENTIRE NUMBERS

From 1 to 11000

1—100

N	M	N	M	N	M	N	M	N	M
1	.00 000	**21**	.32 222	**41**	.61 278	**61**	.78 533	**81**	.90 849
2	30 103	22	34 242	42	62 325	62	79 239	82	91 381
3	47 712	23	36 173	43	63 347	63	79 934	83	91 908
4	60 206	24	38 021	44	64 345	64	80 618	84	92 428
5	69 897	25	39 794	45	65 321	65	81 291	85	92 942
6	.77 815	**26**	.41 497	**46**	.66 276	**66**	.81 954	**86**	.93 450
7	84 510	27	43 136	47	67 210	67	82 607	87	93 952
8	90 309	28	44 716	48	68 124	68	83 251	88	94 448
9	95 424	29	46 240	49	69 020	69	83 885	89	94 939
10	00 000	30	47 712	50	69 897	70	84 510	90	95 424
11	.04 139	**31**	.49 136	**51**	.70 757	**71**	.85 126	**91**	.95 904
12	07 918	32	50 515	52	71 600	72	85 733	92	96 379
13	11 394	33	51 851	53	72 428	73	86 332	93	96 848
14	14 613	34	53 148	54	73 239	74	86 923	94	97 313
15	17 609	35	54 407	55	74 036	75	87 506	95	97 772
16	.20 412	**36**	.55 630	**56**	.74 819	**76**	.88 081	**96**	.98 227
17	23 045	37	56 820	57	75 587	77	88 649	97	98 677
18	25 527	38	57 978	58	76 343	78	89 209	98	99 123
19	27 875	39	59 106	59	77 085	79	89 763	99	99 564
20	30 103	40	60 206	60	77 815	80	90 309	100	00 000

N	0	1	2	3	4	5	6	7	8	9	Dif.	
100	.**00** 000	.00 043	.00 087	.00 130	.00 173	.00 217	.00 260	.00 303	.00 346	.00 389	**40**	**39**
101	432	475	518	561	604	647	689	732	775	817	4	4
102	860	903	945	988	**01** 030	01 072	01 115	01 157	01 199	01 242	8	8
103	01 284	01 326	01 368	01 410	452	494	536	578	620	662	12	12
104	703	745	787	828	870	912	953	995	**02** 036	02 078	16	16
105	.02 119	.02 160	.02 202	.02 243	.02 284	.02 325	.02 366	.02 407	.02 449	.02 490	20	20
106	531	572	612	653	694	735	776	816	857	898	24	23
107	938	979	**03** 019	03 060	03 100	03 141	03 181	03 222	03 262	03 302	28	27
108	03 342	03 383	423	463	503	543	583	623	663	703	32	31
109	743	782	822	862	902	941	981	**04** 021	04 060	04 100	36	35
110	.04 139	.04 179	.04 218	.04 258	.04 297	.04 336	.04 376	.04 415	.04 454	.04 493	**38**	**36**
111	532	571	610	650	689	727	766	805	844	883	4	4
112	922	961	999	**05** 038	05 077	05 115	05 154	05 192	05 231	05 269	8	7
113	05 308	05 346	05 385	423	461	500	538	576	614	652	11	11
114	690	729	767	805	843	881	918	956	994	**06** 032	15	14
115	.06 070	.06 108	.06 145	.06 183	.06 221	.06 258	.06 296	.06 333	.06 371	.06 408	19	18
116	446	483	521	558	595	633	670	707	744	781	23	22
117	819	856	893	930	967	**07** 004	07 041	07 078	07 115	07 151	27	25
118	07 188	07 225	07 262	07 298	07 335	372	408	445	482	518	30	29
119	555	591	628	664	700	737	773	809	846	882	34	32
120	.07 918	.07 954	.07 990	.**08** 027	.08 063	.08 099	.08 135	.08 171	.08 207	.08 243	**34**	**33**
121	08 279	08 314	08 350	386	422	458	493	529	565	600	3	3
122	636	672	707	743	778	814	849	884	920	955	7	7
123	991	**09** 026	09 061	09 096	09 132	09 167	09 202	09 237	09 272	09 307	10	10
124	09 342	377	412	447	482	517	552	587	621	656	14	13
125	.09 691	.09 726	.09 760	.09 795	.09 830	.09 864	.09 899	.09 934	.09 968	.**10** 003	17	17
126	10 037	10 072	10 106	10 140	10 175	10 209	10 243	10 278	10 312	346	20	20
127	380	415	449	483	517	551	585	619	653	687	24	23
128	721	755	789	823	857	890	924	958	992	**11** 025	27	26
129	11 059	11 093	11 126	11 160	11 193	11 227	11 261	11 294	11 327	361	31	30
130	.11 394	.11 428	.11 461	.11 494	.11 528	.11 561	.11 594	.11 628	.11 661	.11 694	**32**	**31**
131	727	760	793	826	860	893	926	959	992	**12** 024	3	3
132	12 057	12 090	12 123	12 156	12 189	12 222	12 254	12 287	12 320	352	6	6
133	385	418	450	483	516	548	581	613	646	678	10	9
134	710	743	775	808	840	872	905	937	969	**13** 001	13	12
135	.13 033	.13 066	.13 098	.13 130	.13 162	.13 194	.13 226	.13 258	.13 290	.13 322	16	16
136	354	386	418	450	481	513	545	577	609	640	19	19
137	672	704	735	767	799	830	862	893	925	956	22	22
138	988	**14** 019	14 051	14 082	14 114	14 145	14 176	14 208	14 239	14 270	26	25
139	14 301	333	364	395	426	457	489	520	551	582	29	28
140	.14 613	.14 644	.14 675	.14 706	.14 737	.14 768	.14 799	.14 829	.14 860	.14 891	**30**	**29**
141	922	953	983	**15** 014	15 045	15 076	15 106	15 137	15 168	15 198	3	3
142	15 229	15 259	15 290	320	351	381	412	442	473	503	6	6
143	534	564	594	625	655	685	715	746	776	806	9	9
144	836	866	897	927	957	987	**16** 017	16 047	16 077	16 107	12	12
145	.16 137	.16 167	.16 197	.16 227	.16 256	.16 286	.16 316	.16 346	.16 376	.16 406	15	15
146	435	465	495	524	554	584	613	643	673	702	18	17
147	732	761	791	820	850	879	909	938	967	997	21	20
148	**17** 026	17 056	17 085	17 114	17 143	17 173	17 202	17 231	17 260	17 289	24	23
149	319	348	377	406	435	464	493	522	551	580	27	26
150	.17 609	.17 638	.17 667	.17 696	.17 725	.17 754	.17 782	.17 811	.17 840	.17 869		
N	0	1	2	3	4	5	6	7	8	9		

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.00 000

N	0	1	2	3	4	5	6	7	8	9	Dif.	
150	.17 609	.17 638	.17 667	.17 696	.17 725	.17 754	.17 782	.17 811	.17 840	.17 869	**29**	**27**
151	898	926	955	984	**18** 013	18 041	18 070	18 099	18 127	18 156	3	3
152	18 184	18 213	18 241	18 270	298	327	355	384	412	441	6	5
153	469	498	526	554	583	611	639	667	696	724	9	8
154	752	780	808	837	865	893	921	949	977	**19** 005	12	11
155	.19 033	.19 061	.19 089	.19 117	.19 145	.19 173	.19 201	.19 229	.19 257	.19 285	15	14
156	312	340	368	396	424	451	479	507	535	562	17	16
157	590	618	645	673	700	728	756	783	811	838	20	19
158	866	893	921	948	976	**20** 003	20 030	20 058	20 085	20 112	23	22
159	20 140	20 167	20 194	20 222	20 249	276	303	330	358	385	26	24
160	.20 412	.20 439	.20 466	.20 493	.20 520	.20 548	.20 575	.20 602	.20 629	.20 656	**26**	**25**
161	683	710	737	763	790	817	844	871	898	925	3	3
162	952	978	**21** 005	21 032	21 059	21 085	21 112	21 139	21 165	21 192	5	5
163	21 219	21 245	272	299	325	352	378	405	431	458	8	8
164	484	511	537	564	590	617	643	669	696	722	10	10
165	.21 748	.21 775	.21 801	.21 827	.21 854	.21 880	.21 906	.21 932	.21 958	.21 985	13	13
166	**22** 011	22 037	22 063	22 089	22 115	22 141	22 167	22 194	22 220	22 246	16	15
167	272	298	324	350	376	401	427	453	479	505	18	18
168	531	557	583	608	634	660	686	712	737	763	21	20
169	789	814	840	866	891	917	943	968	994	**23** 019	23	23
170	.23 045	.23 070	.23 096	.23 121	.23 147	.23 172	.23 198	.23 223	.23 249	.23 274	**25**	**24**
171	300	325	350	376	401	426	452	477	502	528	3	2
172	553	578	603	629	654	679	704	729	754	779	5	5
173	805	830	855	880	905	930	955	980	**24** 005	24 030	8	7
174	24 055	24 080	24 105	24 130	24 155	24 180	24 204	24 229	254	279	10	10
175	.24 304	.24 329	.24 353	.24 378	.24 403	.24 428	.24 452	.24 477	.24 502	.24 527	13	12
176	551	576	601	625	650	674	699	724	748	773	15	14
177	797	822	846	871	895	920	944	969	993	**25** 018	18	17
178	25 042	25 066	25 091	25 115	25 139	25 164	25 188	25 212	25 237	261	20	19
179	285	310	334	358	382	406	431	455	479	503	23	22
180	.25 527	.25 551	.25 575	.25 600	.25 624	.25 648	.25 672	.25 696	.25 720	.25 744	**24**	**23**
181	768	792	816	840	864	888	912	935	959	983	2	2
182	**26** 007	26 031	26 055	26 079	26 102	26 126	26 150	26 174	26 198	26 221	5	5
183	245	269	293	316	340	364	387	411	435	458	7	7
184	482	505	529	553	576	600	623	647	670	694	10	9
185	.26 717	.26 741	.26 764	.26 788	.26 811	.26 834	.26 858	.26 881	.26 905	.26 928	12	12
186	951	975	998	**27** 021	27 045	27 068	27 091	27 114	27 138	27 161	14	14
187	27 184	27 207	27 231	254	277	300	323	346	370	393	17	16
188	416	439	462	485	508	531	554	577	600	623	19	18
189	646	669	692	715	738	761	784	807	830	852	22	21
190	.27 875	.27 898	.27 921	.27 944	.27 967	.27 989	**.28** 012	.28 035	.28 058	.28 081	**22**	**21**
191	28 103	28 126	28 149	28 171	28 194	28 217	240	262	285	307	2	2
192	330	353	375	398	421	443	466	488	511	533	4	4
193	556	578	601	623	646	668	691	713	735	758	7	6
194	780	803	825	847	870	892	914	937	959	981	9	8
195	**.29** 003	.29 026	.29 048	.29 070	.29 092	.29 115	.29 137	.29 159	.29 181	.29 203	11	11
196	226	248	270	292	314	336	358	380	403	425	13	13
197	447	469	491	513	535	557	579	601	623	645	15	15
198	667	688	710	732	754	776	798	820	842	863	18	17
199	885	907	929	951	973	994	**30** 016	30 038	30 060	30 081	20	19
200	.30 103	.30 125	.30 146	.30 168	.30 190	.30 211	.30 233	.30 255	.30 276	.30 298		
N	0	1	2	3	4	5	6	7	8	9		

1
.00 000

2
.30 103

N	0	1	2	3	4	5	6	7	8	9	Dif.
200	.30 103	.30 125	.30 146	.30 168	.30 190	.30 211	.30 233	.30 255	.30 276	.30 298	**21**
201	320	341	363	384	406	428	449	471	492	514	2
202	535	557	578	600	621	643	664	685	707	728	4
203	750	771	792	814	835	856	878	899	920	942	6
204	963	984	**31** 006	31 027	31 048	31 069	31 091	31 112	31 133	31 154	8
205	.31 175	.31 197	.31 218	.31 239	.31 260	.31 281	.31 302	.31 323	.31 345	.31 366	11
206	387	408	429	450	471	492	513	534	555	576	13
207	597	618	639	660	681	702	723	744	765	785	15
208	806	827	848	869	890	911	931	952	973	994	17
209	**32** 015	32 035	32 056	32 077	32 098	32 118	32 139	32 160	32 181	32 201	19
210	.32 222	.32 243	.32 263	.32 284	.32 305	.32 325	.32 346	.32 366	.32 387	.32 408	**20**
211	428	449	469	490	510	531	552	572	593	613	2
212	634	654	675	695	715	736	756	777	797	818	4
213	838	858	879	899	919	940	960	980	**33** 001	33 021	6
214	33 041	33 062	33 082	33 102	33 122	33 143	33 163	33 183	203	224	8
215	.33 244	.33 264	.33 284	.33 304	.33 325	.33 345	.33 365	.33 385	.33 405	.33 425	10
216	445	465	486	506	526	546	566	586	606	626	12
217	646	666	686	706	726	746	766	786	806	826	14
218	846	866	885	905	925	945	965	985	**34** 005	34 025	16
219	34 044	34 064	34 084	34 104	34 124	34 143	34 163	34 183	203	223	18
220	.34 242	.34 262	.34 282	.34 301	.34 321	.34 341	.34 361	.34 380	.34 400	.34 420	**19**
221	439	459	479	498	518	537	557	577	596	616	2
222	635	655	674	694	713	733	753	772	792	811	4
223	830	850	869	889	908	928	947	967	986	**35** 005	6
224	35 025	35 044	35 064	35 083	35 102	35 122	35 141	35 160	35 180	199	8
225	.35 218	.35 238	.35 257	.35 276	.35 295	.35 315	.35 334	.35 353	.35 372	.35 392	10
226	411	430	449	468	488	507	526	545	564	583	11
227	603	622	641	660	679	698	717	736	755	774	13
228	793	813	832	851	870	889	908	927	946	965	15
229	984	**36** 003	36 021	36 040	36 059	36 078	36 097	36 116	36 135	36 154	17
230	.36 173	.36 192	.36 211	.36 229	.36 248	.36 267	.36 286	.36 305	.36 324	.36 342	**18**
231	361	380	399	418	436	455	474	493	511	530	2
232	549	568	586	605	624	642	661	680	698	717	4
233	736	754	773	791	810	829	847	866	884	903	5
234	922	940	959	977	996	**37** 014	37 033	37 051	37 070	37 088	7
235	.37 107	.37 125	.37 144	.37 162	.37 181	.37 199	.37 218	.37 236	.37 254	.37 273	9
236	291	310	328	346	365	383	401	420	438	457	11
237	475	493	511	530	548	566	585	603	621	639	13
238	658	676	694	712	731	749	767	785	803	822	14
239	840	858	876	894	912	931	949	967	985	**38** 003	16
240	.38 021	.38 039	.38 057	.38 075	.38 093	.38 112	.38 130	.38 148	.38 166	.38 184	**17**
241	202	220	238	256	274	292	310	328	346	364	2
242	382	399	417	435	453	471	489	507	525	543	3
243	561	578	596	614	632	650	668	686	703	721	5
244	739	757	775	792	810	828	846	863	881	899	7
245	.38 917	.38 934	.38 952	.38 970	.38 987	**.39** 005	.39 023	.39 041	.39 058	.39 076	9
246	39 094	39 111	39 129	39 146	39 164	182	199	217	235	252	10
247	270	287	305	322	340	358	375	393	410	428	12
248	445	463	480	498	515	533	550	568	585	602	14
249	620	637	655	672	690	707	724	742	759	777	15
250	.39 794	.39 811	.39 829	.39 846	.39 863	.39 881	.39 898	.39 915	.39 933	.39 950	
N	0	1	2	3	4	5	6	7	8	9	

N	0	1	2	3	4	5	6	7	8	9	Dif.
250	.39 794	.39 811	.39 829	.39 846	.39 863	.39 881	.39 898	.39 915	.39 933	.39 950	18
251	967	985	40 002	40 019	40 037	40 054	40 071	40 088	40 106	40 123	2
252	40 140	40 157	175	192	209	226	243	261	278	295	4
253	312	329	346	364	381	398	415	432	449	466	5
254	483	500	518	535	552	569	586	603	620	637	7
255	.40 654	.40 671	.40 688	.40 705	.40 722	.40 739	.40 756	.40 773	.40 790	.40 807	9
256	824	841	858	875	892	909	926	943	960	976	11
257	993	41 010	41 027	41 044	41 061	41 078	41 095	41 111	41 128	41 145	13
258	41 162	179	196	212	229	246	263	280	296	313	14
259	330	347	363	380	397	414	430	447	464	481	16
260	.41 497	.41 514	.41 531	.41 547	.41 564	.41 581	.41 597	.41 614	.41 631	.41 647	17
261	664	681	697	714	731	747	764	780	797	814	2
262	830	847	863	880	896	913	929	946	963	979	3
263	996	42 012	42 029	42 045	42 062	42 078	42 095	42 111	42 127	42 144	5
264	42 160	177	193	210	226	243	259	275	292	308	7
265	.42 325	.42 341	.42 357	.42 374	.42 390	.42 406	.42 423	.42 439	.42 455	.42 472	9
266	488	504	521	537	553	570	586	602	619	635	10
267	651	667	684	700	716	732	749	765	781	797	12
268	813	830	846	862	878	894	911	927	943	959	14
269	975	991	43 008	43 024	43 040	43 056	43 072	43 088	43 104	43 120	15
270	.43 136	.43 152	.43 169	.43 185	.43 201	.43 217	.43 233	.43 249	.43 265	.43 281	16
271	297	313	329	345	361	377	393	409	425	441	2
272	457	473	489	505	521	537	553	569	584	600	3
273	616	632	648	664	680	696	712	727	743	759	5
274	775	791	807	823	838	854	870	886	902	917	6
275	.43 933	.43 949	.43 965	.43 981	.43 996	.44 012	.44 028	.44 044	.44 059	.44 075	8
276	44 091	44 107	44 122	44 138	44 154	170	185	201	217	232	10
277	248	264	279	295	311	326	342	358	373	389	11
278	404	420	436	451	467	483	498	514	529	545	13
279	560	576	592	607	623	638	654	669	685	700	14
280	.44 716	.44 731	.44 747	.44 762	.44 778	.44 793	.44 809	.44 824	.44 840	.44 855	15
281	871	886	902	917	932	948	963	979	994	45 010	2
282	45 025	45 040	45 056	45 071	45 086	45 102	45 117	45 133	45 148	163	3
283	179	194	209	225	240	255	271	286	301	317	5
284	332	347	362	378	393	408	423	439	454	469	6
285	.45 484	.45 500	.45 515	.45 530	.45 545	.45 561	.45 576	.45 591	.45 606	.45 621	8
286	637	652	667	682	697	712	728	743	758	773	9
287	788	803	818	834	849	864	879	894	909	924	11
288	939	954	969	984	46 000	46 015	46 030	46 045	46 060	46 075	12
289	46 090	46 105	46 120	46 135	150	165	180	195	210	225	14
290	.46 240	.46 255	.46 270	.46 285	.46 300	.46 315	.46 330	.46 345	.46 359	.46 374	14
291	389	404	419	434	449	464	479	494	509	523	1
292	538	553	568	583	598	613	627	642	657	672	3
293	687	702	716	731	746	761	776	790	805	820	4
294	835	850	864	879	894	909	923	938	953	967	6
295	.46 982	.46 997	.47 012	.47 026	.47 041	.47 056	.47 070	.47 085	.47 100	.47 114	7
296	47 129	47 144	159	173	188	202	217	232	246	261	8
297	276	290	305	319	334	349	363	378	392	407	10
298	422	436	451	465	480	494	509	524	538	553	11
299	567	582	596	611	625	640	654	669	683	698	13
300	.47 712	.47 727	.47 741	.47 756	.47 770	.47 784	.47 799	.47 813	.47 828	.47 842	
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300	.47 712	.47 727	.47 741	.47 756	.47 770	.47 784	.47 799	.47 813	.47 828	.47 842	15
301	857	871	885	900	914	929	943	958	972	986	2
302	**48** 001	48 015	48 029	48 044	48 058	48 073	48 087	48 101	48 116	48 130	3
303	144	159	173	187	202	216	230	244	259	273	5
304	287	302	316	330	344	359	373	387	401	416	6
305	.48 430	.48 444	.48 458	.48 473	.48 487	.48 501	.48 515	.48 530	.48 544	.48 558	8
306	572	586	601	615	629	643	657	671	686	700	9
307	714	728	742	756	770	785	799	813	827	841	11
308	855	869	883	897	911	926	940	954	968	982	12
309	996	**49** 010	49 024	49 038	49 052	49 066	49 080	49 094	49 108	49 122	14
310	.49 136	.49 150	.49 164	.49 178	.49 192	.49 206	.49 220	.49 234	.49 248	.49 262	14
311	276	290	304	318	332	346	360	374	388	402	1
312	415	429	443	457	471	485	499	513	527	541	3
313	554	568	582	596	610	624	638	651	665	679	4
314	693	707	721	734	748	762	776	790	803	817	6
315	.49 831	.49 845	.49 859	.49 872	.49 886	.49 900	.49 914	.49 927	.49 941	.49 955	7
316	969	982	996	**50** 010	50 024	50 037	50 051	50 065	50 079	50 092	8
317	50 106	50 120	50 133	147	161	174	188	202	215	229	10
318	243	256	270	284	297	311	325	338	352	365	11
319	379	393	406	420	433	447	461	474	488	501	13
320	.50 515	.50 529	.50 542	.50 556	.50 569	.50 583	.50 596	.50 610	.50 623	.50 637	13
321	651	664	678	691	705	718	732	745	759	772	1
322	786	799	813	826	840	853	866	880	893	907	3
323	920	934	947	961	974	987	**51** 001	51 014	51 028	51 041	4
324	51 055	51 068	51 081	51 095	51 108	51 121	135	148	162	175	5
325	.51 188	.51 202	.51 215	.51 228	.51 242	.51 255	.51 268	.51 282	.51 295	.51 308	7
326	322	335	348	362	375	388	402	415	428	441	8
327	455	468	481	495	508	521	534	548	561	574	9
328	587	601	614	627	640	654	667	680	693	706	10
329	720	733	746	759	772	786	799	812	825	838	12
330	.51 851	.51 865	.51 878	.51 891	.51 904	.51 917	.51 930	.51 943	.51 957	.51 970	13
331	983	996	**52** 009	52 022	52 035	52 048	52 061	52 075	52 088	52 101	1
332	52 114	52 127	140	153	166	179	192	205	218	231	3
333	244	257	270	284	297	310	323	336	349	362	4
334	375	388	401	414	427	440	453	466	479	492	5
335	.52 504	.52 517	.52 530	.52 543	.52 556	.52 569	.52 582	.52 595	.52 608	.52 621	7
336	634	647	660	673	686	699	711	724	737	750	8
337	763	776	789	802	815	827	840	853	866	879	9
338	892	905	917	930	943	956	969	982	994	**53** 007	10
339	53 020	53 033	53 046	53 058	53 071	53 084	53 097	53 110	53 122	135	12
340	.53 148	.53 161	.53 173	.53 186	.53 199	.53 212	.53 224	.53 237	.53 250	.53 263	12
341	275	288	301	314	326	339	352	364	377	390	1
342	403	415	428	441	453	466	479	491	504	517	2
343	529	542	555	567	580	593	605	618	631	643	4
344	656	668	681	694	706	719	732	744	757	769	5
345	.53 782	.53 794	.53 807	.53 820	.53 832	.53 845	.53 857	.53 870	.53 882	.53 895	6
346	908	920	933	945	958	970	983	995	**54** 008	54 020	7
347	54 033	54 045	54 058	54 070	54 083	54 095	54 108	54 120	133	145	8
348	158	170	183	195	208	220	233	245	258	270	10
349	283	295	307	320	332	345	357	370	382	394	11
350	.54 407	.54 419	.54 432	.54 444	.54 456	.54 469	.54 481	.54 494	.54 506	.54 518	
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350	.54 407	.54 419	.54 432	.54 444	.54 456	.54 469	.54 481	.54 494	.54 506	.54 518	**13**
351	531	543	555	568	580	593	605	617	630	642	1
352	654	667	679	691	704	716	728	741	753	765	3
353	777	790	802	814	827	839	851	864	876	888	4
354	900	913	925	937	949	962	974	986	998	**55** 011	5
355	.55 023	.55 035	.55 047	.55 060	.55 072	.55 084	.55 096	.55 108	.55 121	.55 133	7
356	145	157	169	182	194	206	218	230	242	255	8
357	267	279	291	303	315	328	340	352	364	376	9
358	388	400	413	425	437	449	461	473	485	497	10
359	509	522	534	546	558	570	582	594	606	618	12
360	.55 630	.55 642	.55 654	.55 666	.55 678	.55 691	.55 703	.55 715	.55 727	.55 739	**12**
361	751	763	775	787	799	811	823	835	847	859	1
362	871	883	895	907	919	931	943	955	967	979	2
363	991	**56** 003	56 015	56 027	56 038	56 050	56 062	56 074	56 086	56 098	4
364	56 110	122	134	146	158	170	182	194	205	217	5
365	.56 229	.56 241	.56 253	.56 265	.56 277	.56 289	.56 301	.56 312	.56 324	.56 336	6
366	348	360	372	384	396	407	419	431	443	455	7
367	467	478	490	502	514	526	538	549	561	573	8
368	585	597	608	620	632	644	656	667	679	691	10
369	703	714	726	738	750	761	773	785	797	808	11
370	.56 820	.56 832	.56 844	.56 855	.56 867	.56 879	.56 891	.56 902	.56 914	.56 926	**12**
371	937	949	961	972	984	996	**57** 008	57 019	57 031	57 043	1
372	57 054	57 066	57 078	57 089	57 101	57 113	124	136	148	159	2
373	171	183	194	206	217	229	241	252	264	276	4
374	287	299	310	322	334	345	357	368	380	392	5
375	.57 403	.57 415	.57 426	.57 438	.57 449	.57 461	.57 473	.57 484	.57 496	.57 507	6
376	519	530	542	553	565	576	588	600	611	623	7
377	634	646	657	669	680	692	703	715	726	738	8
378	749	761	772	784	795	807	818	830	841	852	10
379	864	875	887	898	910	921	933	944	955	967	11
380	.57 978	.57 990	**.58** 001	.58 013	.58 024	.58 035	.58 047	.58 058	.58 070	.58 081	**11**
381	58 092	58 104	115	127	138	149	161	172	184	195	1
382	206	218	229	240	252	263	274	286	297	309	2
383	320	331	343	354	365	377	388	399	410	422	3
384	433	444	456	467	478	490	501	512	524	535	4
385	.58 546	.58 557	.58 569	.58 580	.58 591	.58 602	.58 614	.58 625	.58 636	.58 647	6
386	659	670	681	692	704	715	726	737	749	760	7
387	771	782	794	805	816	827	838	850	861	872	8
388	883	894	906	917	928	939	950	961	973	984	9
389	995	**59** 006	59 017	59 028	59 040	59 051	59 062	59 073	59 084	59 095	10
390	.59 106	.59 118	.59 129	.59 140	.59 151	.59 162	.59 173	.59 184	.59 195	.59 207	**11**
391	218	229	240	251	262	273	284	295	306	318	1
392	329	340	351	362	373	384	395	406	417	428	2
393	439	450	461	472	483	494	506	517	528	539	3
394	550	561	572	583	594	605	616	627	638	649	4
395	.59 660	.59 671	.59 682	.59 693	.59 704	.59 715	.59 726	.59 737	.59 748	.59 759	6
396	770	780	791	802	813	824	835	846	857	868	7
397	879	890	901	912	923	934	945	956	966	977	8
398	988	999	**60** 010	60 021	60 032	60 043	60 054	60 065	60 076	60 086	9
399	60 097	60 108	119	130	141	152	163	173	184	195	10
400	.60 206	.60 217	.60 228	.60 239	.60 249	.60 260	.60 271	.60 282	.60 293	.60 304	
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400	.60 206	.60 217	.60 228	.60 239	.60 249	.60 260	.60 271	.60 282	.60 293	.60 304	11
401	314	325	336	347	358	369	379	390	401	412	1
402	423	433	444	455	466	477	487	498	509	520	2
403	531	541	552	563	574	584	595	606	617	627	3
404	638	649	660	670	681	692	703	713	724	735	4
405	.60 746	.60 756	.60 767	.60 778	.60 788	.60 799	.60 810	.60 821	.60 831	.60 842	6
406	853	863	874	885	895	906	917	927	938	949	7
407	959	970	981	991	**61** 002	61 013	61 023	61 034	61 045	61 055	8
408	61 066	61 077	61 087	61 098	109	119	130	140	151	162	9
409	172	183	194	204	215	225	236	247	257	268	10
410	.61 278	.61 289	.61 300	.61 310	.61 321	.61 331	.61 342	.61 352	.61 363	.61 374	11
411	384	395	405	416	426	437	448	458	469	479	1
412	490	500	511	521	532	542	553	563	574	584	2
413	595	606	616	627	637	648	658	669	679	690	3
414	700	711	721	731	742	752	763	773	784	794	4
415	.61 805	.61 815	.61 826	.61 836	.61 847	.61 857	.61 868	.61 878	.61 888	.61 899	6
416	909	920	930	941	951	962	972	982	993	**62** 003	7
417	62 014	62 024	62 034	62 045	62 055	62 066	62 076	62 086	62 097	107	8
418	118	128	138	149	159	170	180	190	201	211	9
419	221	232	242	252	263	273	284	294	304	315	10
420	.62 325	.62 335	.62 346	.62 356	.62 366	.62 377	.62 387	.62 397	.62 408	.62 418	10
421	428	439	449	459	469	480	490	500	511	521	1
422	531	542	552	562	572	583	593	603	613	624	2
423	634	644	655	665	675	685	696	706	716	726	3
424	737	747	757	767	778	788	798	808	818	829	4
425	.62 839	.62 849	.62 859	.62 870	.62 880	.62 890	.62 900	.62 910	.62 921	.62 931	5
426	941	951	961	972	982	992	**63** 002	63 012	63 022	63 033	6
427	63 043	63 053	63 063	63 073	63 083	63 094	104	114	124	134	7
428	144	155	165	175	185	195	205	215	225	236	8
429	246	256	266	276	286	296	306	317	327	337	9
430	.63 347	.63 357	.63 367	.63 377	.63 387	.63 397	.63 407	.63 417	.63 428	.63 438	10
431	448	458	468	478	488	498	508	518	528	538	1
432	548	558	568	579	589	599	609	619	629	639	2
433	649	659	669	679	689	699	709	719	729	739	3
434	749	759	769	779	789	799	809	819	829	839	4
435	.63 849	.63 859	.63 869	.63 879	.63 889	.63 899	.63 909	.63 919	.63 929	.63 939	5
436	949	959	969	979	988	998	**64** 008	64 018	64 028	64 038	6
437	64 048	64 058	64 068	64 078	64 088	64 098	108	118	128	137	7
438	147	157	167	177	187	197	207	217	227	237	8
439	246	256	266	276	286	296	306	316	326	335	9
440	.64 345	.64 355	.64 365	.64 375	.64 385	.64 395	.64 404	.64 414	.64 424	.64 434	9
441	444	454	464	473	483	493	503	513	523	532	1
442	542	552	562	572	582	591	601	611	621	631	2
443	640	650	660	670	680	689	699	709	719	729	3
444	738	748	758	768	777	787	797	807	816	826	4
445	.64 836	.64 846	.64 856	.64 865	.64 875	.64 885	.64 895	.64 904	.64 914	.64 924	5
446	933	943	953	963	972	982	992	**65** 002	65 011	65 021	5
447	65 031	65 040	65 050	65 060	65 070	65 079	65 089	099	108	118	6
448	128	137	147	157	167	176	186	196	205	215	7
449	225	234	244	254	263	273	283	292	302	312	8
450	.65 321	.65 331	.65 341	.65 350	.65 360	.65 369	.65 379	.65 389	.65 398	.65 408	
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450	.65 321	.65 331	.65 341	.65 350	.65 360	.65 369	.65 379	.65 389	.65 398	.65 408	**10**
451	418	427	437	447	456	466	475	485	495	504	1
452	514	523	533	543	552	562	571	581	591	600	2
453	610	619	629	639	648	658	667	677	686	696	3
454	706	715	725	734	744	753	763	772	782	792	4
455	.65 801	.65 811	.65 820	.65 830	.65 839	.65 849	.65 858	.65 868	.65 877	.65 887	5
456	896	906	916	925	935	944	954	963	973	982	6
457	992	**66** 001	66 011	66 020	66 030	66 039	66 049	66 058	66 068	66 077	7
458	66 087	096	106	115	124	134	143	153	162	172	8
459	181	191	200	210	219	229	238	247	257	266	9
460	.66 276	.66 285	.66 295	.66 304	.66 314	.66 323	.66 332	.66 342	.66 351	.66 361	**9**
461	370	380	389	398	408	417	427	436	445	455	1
462	464	474	483	492	502	511	521	530	539	549	2
463	558	567	577	586	596	605	614	624	633	642	3
464	652	661	671	680	689	699	708	717	727	736	4
465	.66 745	.66 755	.66 764	.66 773	.66 783	.66 792	.66 801	.66 811	.66 820	.66 829	5
466	839	848	857	867	876	885	894	904	913	922	5
467	932	941	950	960	969	978	987	997	**67** 006	67 015	6
468	67 025	67 034	67 043	67 052	67 062	67 071	67 080	67 089	099	108	7
469	117	127	136	145	154	164	173	182	191	201	8
470	.67 210	.67 219	.67 228	.67 237	.67 247	.67 256	.67 265	.67 274	.67 284	.67 293	**9**
471	302	311	321	330	339	348	357	367	376	385	1
472	394	403	413	422	431	440	449	459	468	477	2
473	486	495	504	514	523	532	541	550	560	569	3
474	578	587	596	605	614	624	633	642	651	660	4
475	.67 669	.67 679	.67 688	.67 697	.67 706	.67 715	.67 724	.67 733	.67 742	.67 752	5
476	761	770	779	788	797	806	815	825	834	843	5
477	852	861	870	879	888	897	906	916	925	934	6
478	943	952	961	970	979	988	997	**68** 006	68 015	68 024	7
479	68 034	68 043	68 052	68 061	68 070	68 079	68 088	097	106	115	8
480	.68 124	.68 133	.68 142	.68 151	.68 160	.68 169	.68 178	.68 187	.68 196	.68 205	**9**
481	215	224	233	242	251	260	269	278	287	296	1
482	305	314	323	332	341	350	359	368	377	386	2
483	395	404	413	422	431	440	449	458	467	476	3
484	485	494	502	511	520	529	538	547	556	565	4
485	.68 574	.68 583	.68 592	.68 601	.68 610	.68 619	.68 628	.68 637	.68 646	.68 655	5
486	664	673	681	690	699	708	717	726	735	744	5
487	753	762	771	780	789	797	806	815	824	833	6
488	842	851	860	869	878	886	895	904	913	922	7
489	931	940	949	958	966	975	984	993	**69** 002	69 011	8
490	.69 020	.69 028	.69 037	.69 046	.69 055	.69 064	.69 073	.69 082	.69 090	.69 099	**8**
491	108	117	126	135	144	152	161	170	179	188	1
492	197	205	214	223	232	241	249	258	267	276	2
493	285	294	302	311	320	329	338	346	355	364	2
494	373	381	390	399	408	417	425	434	443	452	3
495	.69 461	.69 469	.69 478	.69 487	.69 496	.69 504	.69 513	.69 522	.69 531	.69 539	4
496	548	557	566	574	583	592	601	609	618	627	5
497	636	644	653	662	671	679	688	697	705	714	6
498	723	732	740	749	758	767	775	784	793	801	6
499	810	819	827	836	845	854	862	871	880	888	7
500	.69 897	.69 906	.69 914	.69 923	.69 932	.69 940	.69 949	.69 958	.69 966	.69 975	
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500	.69 897	.69 906	.69 914	.69 923	.69 932	.69 940	.69 949	.69 958	.69 966	.69 975	9
501	984	992	**70** 001	70 010	70 018	70 027	70 036	70 044	70 053	70 062	1
502	70 070	70 079	088	096	105	114	122	131	140	148	2
503	157	165	174	183	191	200	209	217	226	234	3
504	243	252	260	269	278	286	295	303	312	321	4
505	.70 329	.70 338	.70 346	.70 355	.70 364	.70 372	.70 381	.70 389	.70 398	.70 406	5
506	415	424	432	441	449	458	467	475	484	492	5
507	501	509	518	526	535	544	552	561	569	578	6
508	586	595	603	612	621	629	638	646	655	663	7
509	672	680	689	697	706	714	723	731	740	749	8
510	.70 757	.70 766	.70 774	.70 783	.70 791	.70 800	.70 808	.70 817	.70 825	.70 834	8
511	842	851	859	868	876	885	893	902	910	919	1
512	927	935	944	952	961	969	978	986	995	**71** 003	2
513	71 012	71 020	71 029	71 037	71 046	71 054	71 063	71 071	71 079	088	2
514	096	105	113	122	130	139	147	155	164	172	3
515	.71 181	.71 189	.71 198	.71 206	.71 214	.71 223	.71 231	.71 240	.71 248	.71 257	4
516	265	273	282	290	299	307	315	324	332	341	5
517	349	357	366	374	383	391	399	408	416	425	6
518	433	441	450	458	466	475	483	492	500	508	6
519	517	525	533	542	550	559	567	575	584	592	7
520	.71 600	.71 609	.71 617	.71 625	.71 634	.71 642	.71 650	.71 659	.71 667	.71 675	8
521	684	692	700	709	717	725	734	742	750	759	1
522	767	775	784	792	800	809	817	825	834	842	2
523	850	858	867	875	883	892	900	908	917	925	2
524	933	941	950	958	966	975	983	991	999	**72** 008	3
525	.72 016	.72 024	.72 032	.72 041	.72 049	.72 057	.72 066	.72 074	.72 082	.72 090	4
526	099	107	115	123	132	140	148	156	165	173	5
527	181	189	198	206	214	222	230	239	247	255	6
528	263	272	280	288	296	304	313	321	329	337	6
529	346	354	362	370	378	387	395	403	411	419	7
530	.72 428	.72 436	.72 444	.72 452	.72 460	.72 469	.72 477	.72 485	.72 493	.72 501	8
531	509	518	526	534	542	550	558	567	575	583	1
532	591	599	607	616	624	632	640	648	656	665	2
533	673	681	689	697	705	713	722	730	738	746	2
534	754	762	770	779	787	795	803	811	819	827	3
535	.72 835	.72 843	.72 852	.72 860	.72 868	.72 876	.72 884	.72 892	.72 900	.72 908	4
536	916	925	933	941	949	957	965	973	981	989	5
537	997	**73** 006	73 014	73 022	73 030	73 038	73 046	73 054	73 062	73 070	6
538	73 078	086	094	102	111	119	127	135	143	151	6
539	159	167	175	183	191	199	207	215	223	231	7
540	.73 239	.73 247	.73 255	.73 263	.73 272	.73 280	.73 288	.73 296	.73 304	.73 312	7
541	320	328	336	344	352	360	368	376	384	392	1
542	400	408	416	424	432	440	448	456	464	472	1
543	480	488	496	504	512	520	528	536	544	552	2
544	560	568	576	584	592	600	608	616	624	632	3
545	.73 640	.73 648	.73 656	.73 664	.73 672	.73 679	.73 687	.73 695	.73 703	.73 711	4
546	719	727	735	743	751	759	767	775	783	791	4
547	799	807	815	823	830	838	846	854	862	870	5
548	878	886	894	902	910	918	926	933	941	949	6
549	957	965	973	981	989	997	**74** 005	74 013	74 020	74 028	6
550	.74 036	.74 044	.74 052	.74 060	.74 068	.74 076	.74 084	.74 092	.74 099	.74 107	
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550	.74 036	.74 044	.74 052	.74 060	.74 068	.74 076	.74 084	.74 092	.74 099	.74 107	**8**
551	115	123	131	139	147	155	162	170	178	186	1
552	194	202	210	218	225	233	241	249	257	265	2
553	273	280	288	296	304	312	320	327	335	343	2
554	351	359	367	374	382	390	398	406	414	421	3
555	.74 429	.74 437	.74 445	.74 453	.74 461	.74 468	.74 476	.74 484	.74 492	.74 500	4
556	507	515	523	531	539	547	554	562	570	578	5
557	586	593	601	609	617	624	632	640	648	656	6
558	663	671	679	687	695	702	710	718	726	733	6
559	741	749	757	764	772	780	788	796	803	811	7
560	.74 819	.74 827	.74 834	.74 842	.74 850	.74 858	.74 865	.74 873	.74 881	.74 889	**7**
561	896	904	912	920	927	935	943	950	958	966	1
562	974	981	989	997	**75** 005	75 012	75 020	75 028	75 035	75 043	1
563	75 051	75 059	75 066	75 074	082	089	097	105	113	120	2
564	128	136	143	151	159	166	174	182	189	197	3
565	.75 205	.75 213	.75 220	.75 228	.75 236	.75 243	.75 251	.75 259	.75 266	.75 274	4
566	282	289	297	305	312	320	328	335	343	351	4
567	358	366	374	381	389	397	404	412	420	427	5
568	435	442	450	458	465	473	481	488	496	504	6
569	511	519	526	534	542	549	557	565	572	580	6
570	.75 587	.75 595	.75 603	.75 610	.75 618	.75 626	.75 633	.75 641	.75 648	.75 656	**8**
571	664	671	679	686	694	702	709	717	724	732	1
572	740	747	755	762	770	778	785	793	800	808	2
573	815	823	831	838	846	853	861	868	876	884	2
574	891	899	906	914	921	929	937	944	952	959	3
575	.75 967	.75 974	.75 982	.75 989	.75 997	**.76** 005	.76 012	.76 020	.76 027	.76 035	4
576	76 042	76 050	76 057	76 065	76 072	080	087	095	103	110	5
577	118	125	133	140	148	155	163	170	178	185	6
578	193	200	208	215	223	230	238	245	253	260	6
579	268	275	283	290	298	305	313	320	328	335	7
580	.76 343	.76 350	.76 358	.76 365	.76 373	.76 380	.76 388	.76 395	.76 403	.76 410	**7**
581	418	425	433	440	448	455	462	470	477	485	1
582	492	500	507	515	522	530	537	545	552	559	1
583	567	574	582	589	597	604	612	619	626	634	2
584	641	649	656	664	671	678	686	693	701	708	3
585	.76 716	.76 723	.76 730	.76 738	.76 745	.76 753	.76 760	.76 768	.76 775	.76 782	4
586	790	797	805	812	819	827	834	842	849	856	4
587	864	871	879	886	893	901	908	916	923	930	5
588	938	945	953	960	967	975	982	989	997	**77** 004	6
589	77 012	77 019	77 026	77 034	77 041	77 048	77 056	77 063	77 070	078	6
590	.77 085	.77 093	.77 100	.77 107	.77 115	.77 122	.77 129	.77 137	.77 144	.77 151	**7**
591	159	166	173	181	188	195	203	210	217	225	1
592	232	240	247	254	262	269	276	283	291	298	1
593	305	313	320	327	335	342	349	357	364	371	2
594	379	386	393	401	408	415	422	430	437	444	3
595	.77 452	.77 459	.77 466	.77 474	.77 481	.77 488	.77 495	.77 503	.77 510	.77 517	4
596	525	532	539	546	554	561	568	576	583	590	4
597	597	605	612	619	627	634	641	648	656	663	5
598	670	677	685	692	699	706	714	721	728	735	6
599	743	750	757	764	772	779	786	793	801	808	6
600	.77 815	.77 822	.77 830	.77 837	.77 844	.77 851	.77 859	.77 866	.77 873	.77 880	
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600	.77 815	.77 822	.77 830	.77 837	.77 844	.77 851	.77 859	.77 866	.77 873	.77 880	**8**
601	887	895	902	909	916	924	931	938	945	952	1
602	960	967	974	981	988	996	**78** 003	78 010	78 017	78 025	2
603	78 032	78 039	78 046	78 053	78 061	78 068	075	082	089	097	2
604	104	111	118	125	132	140	147	154	161	168	3
605	.78 176	.78 183	.78 190	.78 197	.78 204	.78 211	.78 219	.78 226	.78 233	.78 240	4
606	247	254	262	269	276	283	290	297	305	312	5
607	319	326	333	340	347	355	362	369	376	383	6
608	390	398	405	412	419	426	433	440	447	455	6
609	462	469	476	483	490	497	504	512	519	526	7
610	.78 533	.78 540	.78 547	.78 554	.78 561	.78 569	.78 576	.78 583	.78 590	.78 597	**7**
611	604	611	618	625	633	640	647	654	661	668	1
612	675	682	689	696	704	711	718	725	732	739	1
613	746	753	760	767	774	781	789	796	803	810	2
614	817	824	831	838	845	852	859	866	873	880	3
615	.78 888	.78 895	.78 902	.78 909	.78 916	.78 923	.78 930	.78 937	.78 944	.78 951	4
616	958	965	972	979	986	993	**79** 000	79 007	79 014	79 021	4
617	79 029	79 036	79 043	79 050	79 057	79 064	071	078	085	092	5
618	099	106	113	120	127	134	141	148	155	162	6
619	169	176	183	190	197	204	211	218	225	232	6
620	.79 239	.79 246	.79 253	.79 260	.79 267	.79 274	.79 281	.79 288	.79 295	.79 302	**7**
621	309	316	323	330	337	344	351	358	365	372	1
622	379	386	393	400	407	414	421	428	435	442	1
623	449	456	463	470	477	484	491	498	505	511	2
624	518	525	532	539	546	553	560	567	574	581	3
625	.79 588	.79 595	.79 602	.79 609	.79 616	.79 623	.79 630	.79 637	.79 644	.79 650	4
626	657	664	671	678	685	692	699	706	713	720	4
627	727	734	741	748	754	761	768	775	782	789	5
628	796	803	810	817	824	831	837	844	851	858	6
629	865	872	879	886	893	900	906	913	920	927	6
630	.79 934	.79 941	.79 948	.79 955	.79 962	.79 969	.79 975	.79 982	.79 989	.79 996	**7**
631	**80** 003	80 010	80 017	80 024	80 030	80 037	80 044	80 051	80 058	80 065	1
632	072	079	085	092	099	106	113	120	127	134	1
633	140	147	154	161	168	175	182	188	195	202	2
634	209	216	223	229	236	243	250	257	264	271	3
635	.80 277	.80 284	.80 291	.80 298	.80 305	.80 312	.80 318	.80 325	.80 332	.80 339	4
636	346	353	359	366	373	380	387	393	400	407	4
637	414	421	428	434	441	448	455	462	468	475	5
638	482	489	496	502	509	516	523	530	536	543	6
639	550	557	564	570	577	584	591	598	604	611	6
640	.80 618	.80 625	.80 632	.80 638	.80 645	.80 652	.80 659	.80 665	.80 672	.80 679	**6**
641	686	693	699	706	713	720	726	733	740	747	1
642	754	760	767	774	781	787	794	801	808	814	1
643	821	828	835	841	848	855	862	868	875	882	2
644	889	895	902	909	916	922	929	936	943	949	2
645	.80 956	.80 963	.80 969	.80 976	.80 983	.80 990	.80 996	**.81** 003	.81 010	.81 017	3
646	81 023	81 030	81 037	81 043	81 050	81 057	81 064	070	077	084	4
647	090	097	104	111	117	124	131	137	144	151	4
648	158	164	171	178	184	191	198	204	211	218	5
649	224	231	238	245	251	258	265	271	278	285	5
650	.81 291	.81 298	.81 305	.81 311	.81 318	.81 325	.81 331	.81 338	.81 345	.81 351	
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650	.81 291	.81 298	.81 305	.81 311	.81 318	.81 325	.81 331	.81 338	.81 345	.81 351	**6**
651	358	365	371	378	385	391	398	405	411	418	1
652	425	431	438	445	451	458	465	471	478	485	1
653	491	498	505	511	518	525	531	538	544	551	2
654	558	564	571	578	584	591	598	604	611	617	2
655	.81 624	.81 631	.81 637	.81 644	.81 651	.81 657	.81 664	.81 671	.81 677	.81 684	3
656	690	697	704	710	717	723	730	737	743	750	4
657	757	763	770	776	783	790	796	803	809	816	4
658	823	829	836	842	849	856	862	869	875	882	5
659	889	895	902	908	915	921	928	935	941	948	5
660	.81 954	.81 961	.81 968	.81 974	.81 981	.81 987	.81 994	**.82** 000	.82 007	.82 014	**7**
661	82 020	82 027	82 033	82 040	82 046	82 053	82 060	066	073	079	1
662	086	092	099	105	112	119	125	132	138	145	1
663	151	158	164	171	178	184	191	197	204	210	2
664	217	223	230	236	243	249	256	263	269	276	3
665	.82 282	.82 289	.82 295	.82 302	.82 308	.82 315	.82 321	.82 328	.82 334	.82 341	4
666	347	354	360	367	373	380	387	393	400	406	4
667	413	419	426	432	439	445	452	458	465	471	5
668	478	484	491	497	504	510	517	523	530	536	6
669	543	549	556	562	569	575	582	588	595	601	6
670	.82 607	.82 614	.82 620	.82 627	.82 633	.82 640	.82 646	.82 653	.82 659	.82 666	**6**
671	672	679	685	692	698	705	711	718	724	730	1
672	737	743	750	756	763	769	776	782	789	795	1
673	802	808	814	821	827	834	840	847	853	860	2
674	866	872	879	885	892	898	905	911	918	924	2
675	.82 930	.82 937	.82 943	.82 950	.82 956	.82 963	.82 969	.82 975	.82 982	.82 988	3
676	995	**83** 001	83 008	83 014	83 020	83 027	83 033	83 040	83 046	83 052	4
677	83 059	065	072	078	085	091	097	104	110	117	4
678	123	129	136	142	149	155	161	168	174	181	5
679	187	193	200	206	213	219	225	232	238	245	5
680	.83 251	.83 257	.83 264	.83 270	.83 276	.83 283	.83 289	.83 296	.83 302	.83 308	**7**
681	315	321	327	334	340	347	353	359	366	372	1
682	378	385	391	398	404	410	417	423	429	436	1
683	442	448	455	461	467	474	480	487	493	499	2
684	506	512	518	525	531	537	544	550	556	563	3
685	.83 569	.83 575	.83 582	.83 588	.83 594	.83 601	.83 607	.83 613	.83 620	.83 626	4
686	632	639	645	651	658	664	670	677	683	689	4
687	696	702	708	715	721	727	734	740	746	753	5
688	759	765	771	778	784	790	797	803	809	816	6
689	822	828	835	841	847	853	860	866	872	879	6
690	.83 885	.83 891	.83 897	.83 904	.83 910	.83 916	.83 923	.83 929	.83 935	.83 942	**6**
691	948	954	960	967	973	979	985	992	998	**84** 004	1
692	84 011	84 017	84 023	84 029	84 036	84 042	84 048	84 055	84 061	067	1
693	073	080	086	092	098	105	111	117	123	130	2
694	136	142	148	155	161	167	173	180	186	192	2
695	.84 198	.84 205	.84 211	.84 217	.84 223	.84 230	.84 236	.84 242	.84 248	.84 255	3
696	261	267	273	280	286	292	298	305	311	317	4
697	323	330	336	342	348	354	361	367	373	379	4
698	386	392	398	404	410	417	423	429	435	442	5
699	448	454	460	466	473	479	485	491	497	504	5
700	.84 510	.84 516	.84 522	.84 528	.84 535	.84 541	.84 547	.84 553	.84 559	.84 566	
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700	.84 510	.84 516	.84 522	.84 528	.84 535	.84 541	.84 547	.84 553	.84 559	.84 566	7
701	572	578	584	590	597	603	609	615	621	628	1
702	634	640	646	652	658	665	671	677	683	689	1
703	696	702	708	714	720	726	733	739	745	751	2
704	757	763	770	776	782	788	794	800	807	813	3
705	.84 819	.84 825	.84 831	.84 837	.84 844	.84 850	.84 856	.84 862	.84 868	.84 874	4
706	880	887	893	899	905	911	917	924	930	936	4
707	942	948	954	960	967	973	979	985	991	997	5
708	**85** 003	85 009	85 016	85 022	85 028	85 034	85 040	85 046	85 052	85 058	6
709	065	071	077	083	089	095	101	107	114	120	6
710	.85 126	.85 132	.85 138	.85 144	.85 150	.85 156	.85 163	.85 169	.85 175	.85 181	6
711	187	193	199	205	211	217	224	230	236	242	1
712	248	254	260	266	272	278	285	291	297	303	1
713	309	315	321	327	333	339	345	352	358	364	2
714	370	376	382	388	394	400	406	412	418	425	2
715	.85 431	.85 437	.85 443	.85 449	.85 455	.85 461	.85 467	.85 473	.85 479	.85 485	3
716	491	497	503	509	516	522	528	534	540	546	4
717	552	558	564	570	576	582	588	594	600	606	4
718	612	618	625	631	637	643	649	655	661	667	5
719	673	679	685	691	697	703	709	715	721	727	5
720	.85 733	.85 739	.85 745	.85 751	.85 757	.85 763	.85 769	.85 775	.85 781	.85 788	6
721	794	800	806	812	818	824	830	836	842	848	1
722	854	860	866	872	878	884	890	896	902	908	1
723	914	920	926	932	938	944	950	956	962	968	2
724	974	980	986	992	998	**86** 004	86 010	86 016	86 022	86 028	2
725	.86 034	.86 040	.86 046	.86 052	.86 058	.86 064	.86 070	.86 076	.86 082	.86 088	3
726	094	100	106	112	118	124	130	136	141	147	4
727	153	159	165	171	177	183	189	195	201	207	4
728	213	219	225	231	237	243	249	255	261	267	5
729	273	279	285	291	297	303	308	314	320	326	5
730	.86 332	.86 338	.86 344	.86 350	.86 356	.86 362	.86 368	.86 374	.86 380	.86 386	6
731	392	398	404	410	415	421	427	433	439	445	1
732	451	457	463	469	475	481	487	493	499	504	1
733	510	516	522	528	534	540	546	552	558	564	2
734	570	576	581	587	593	599	605	611	617	623	2
735	.86 629	.86 635	.86 641	.86 646	.86 652	.86 658	.86 664	.86 670	.86 676	.86 682	3
736	688	694	700	705	711	717	723	729	735	741	4
737	747	753	759	764	770	776	782	788	794	800	4
738	806	812	817	823	829	835	841	847	853	859	5
739	864	870	876	882	888	894	900	906	911	917	5
740	.86 923	.86 929	.86 935	.86 941	.86 947	.86 953	.86 958	.86 964	.86 970	.86 976	5
741	982	988	994	999	**87** 005	87 011	87 017	87 023	87 029	87 035	1
742	87 040	87 046	87 052	87 058	064	070	075	081	087	093	1
743	099	105	111	116	122	128	134	140	146	151	2
744	157	163	169	175	181	186	192	198	204	210	2
745	.87 216	.87 221	.87 227	.87 233	.87 239	.87 245	.87 251	.87 256	.87 262	.87 268	3
746	274	280	286	291	297	303	309	315	320	326	3
747	332	338	344	349	355	361	367	373	379	384	4
748	390	396	402	408	413	419	425	431	437	442	4
749	448	454	460	466	471	477	483	489	495	500	5
750	.87 506	.87 512	.87 518	.87 523	.87 529	.87 535	.87 541	.87 547	.87 552	.87 558	
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750	.87 506	.87 512	.87 518	.87 523	.87 529	.87 535	.87 541	.87 547	.87 552	.87 558	**6**
751	564	570	576	581	587	593	599	604	610	616	1
752	622	628	633	639	645	651	656	662	668	674	1
753	679	685	691	697	703	708	714	720	726	731	2
754	737	743	749	754	760	766	772	777	783	789	2
755	.87 795	.87 800	.87 806	.87 812	.87 818	.87 823	.87 829	.87 835	.87 841	.87 846	3
756	852	858	864	869	875	881	887	892	898	904	4
757	910	915	921	927	933	938	944	950	955	961	4
758	967	973	978	984	990	996	**88** 001	88 007	88 013	88 018	5
759	88 024	88 030	88 036	88 041	88 047	88 053	058	064	070	076	5
760	.88 081	.88 087	.88 093	.88 098	.88 104	.88 110	.88 116	.88 121	.88 127	.88 133	**5**
761	138	144	150	156	161	167	173	178	184	190	1
762	195	201	207	213	218	224	230	235	241	247	1
763	252	258	264	270	275	281	287	292	298	304	2
764	309	315	321	326	332	338	343	349	355	360	2
765	.88 366	.88 372	.88 377	.88 383	.88 389	.88 395	.88 400	.88 406	.88 412	.88 417	3
766	423	429	434	440	446	451	457	463	468	474	3
767	480	485	491	497	502	508	513	519	525	530	4
768	536	542	547	553	559	564	570	576	581	587	4
769	593	598	604	610	615	621	627	632	638	643	5
770	.88 649	.88 655	.88 660	.88 666	.88 672	.88 677	.88 683	.88 689	.88 694	.88 700	**6**
771	705	711	717	722	728	734	739	745	750	756	1
772	762	767	773	779	784	790	795	801	807	812	1
773	818	824	829	835	840	846	852	857	863	868	2
774	874	880	885	891	897	902	908	913	919	925	2
775	.88 930	.88 936	.88 941	.88 947	.88 953	.88 958	.88 964	.88 969	.88 975	.88 981	3
776	986	992	997	**89** 003	89 009	89 014	89 020	89 025	89 031	89 037	4
777	89 042	89 048	89 053	059	064	070	076	081	087	092	4
778	098	104	109	115	120	126	131	137	143	148	5
779	154	159	165	170	176	182	187	193	198	204	5
780	.89 209	.89 215	.89 221	.89 226	.89 232	.89 237	.89 243	.89 248	.89 254	.89 260	**5**
781	265	271	276	282	287	293	298	304	310	315	1
782	321	326	332	337	343	348	354	360	365	371	1
783	376	382	387	393	398	404	409	415	421	426	2
784	432	437	443	448	454	459	465	470	476	481	2
785	.89 487	.89 492	.89 498	.89 504	.89 509	.89 515	.89 520	.89 526	.89 531	.89 537	3
786	542	548	553	559	564	570	575	581	586	592	3
787	597	603	609	614	620	625	631	636	642	647	4
788	653	658	664	669	675	680	686	691	697	702	4
789	708	713	719	724	730	735	741	746	752	757	5
790	.89 763	.89 768	.89 774	.89 779	.89 785	.89 790	.89 796	.89 801	.89 807	.89 812	**6**
791	818	823	829	834	840	845	851	856	862	867	1
792	873	878	883	889	894	900	905	911	916	922	1
793	927	933	938	944	949	955	960	966	971	977	2
794	982	988	993	998	**90** 004	90 009	90 015	90 020	90 026	90 031	2
795	.90 037	.90 042	.90 048	.90 053	.90 059	.90 064	.90 069	.90 075	.90 080	.90 086	3
796	091	097	102	108	113	119	124	129	135	140	4
797	146	151	157	162	168	173	179	184	189	195	4
798	200	206	211	217	222	227	233	238	244	249	5
799	255	260	266	271	276	282	287	293	298	304	5
800	.90 309	.90 314	.90 320	.90 325	.90 331	.90 336	.90 342	.90 347	.90 352	.90 358	
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800	.90 309	.90 314	.90 320	.90 325	.90 331	.90 336	.90 342	.90 347	.90 352	.90 358	**5**
801	363	369	374	380	385	390	396	401	407	412	1
802	417	423	428	434	439	445	450	455	461	466	1
803	472	477	482	488	493	499	504	509	515	520	2
804	526	531	536	542	547	553	558	563	569	574	2
805	.90 580	.90 585	.90 590	.90 596	.90 601	.90 607	.90 612	.90 617	.90 623	.90 628	3
806	634	639	644	650	655	660	666	671	677	682	3
807	687	693	698	703	709	714	720	725	730	736	4
808	741	747	752	757	763	768	773	779	784	789	4
809	795	800	806	811	816	822	827	832	838	843	5
810	.90 849	.90 854	.90 859	.90 865	.90 870	.90 875	.90 881	.90 886	.90 891	.90 897	**6**
811	902	907	913	918	924	929	934	940	945	950	1
812	956	961	966	972	977	982	988	993	998	**91** 004	1
813	91 009	91 014	91 020	91 025	91 030	91 036	91 041	91 046	91 052	057	2
814	062	068	073	078	084	089	094	100	105	110	2
815	.91 116	.91 121	.91 126	.91 132	.91 137	.91 142	.91 148	.91 153	.91 158	.91 164	3
816	169	174	180	185	190	196	201	206	212	217	4
817	222	228	233	238	243	249	254	259	265	270	4
818	275	281	286	291	297	302	307	312	318	323	5
819	328	334	339	344	350	355	360	365	371	376	5
820	.91 381	.91 387	.91 392	.91 397	.91 403	.91 408	.91 413	.91 418	.91 424	.91 429	**5**
821	434	440	445	450	455	461	466	471	477	482	1
822	487	492	498	503	508	514	519	524	529	535	1
823	540	545	551	556	561	566	572	577	582	587	2
824	593	598	603	609	614	619	624	630	635	640	2
825	.91 645	.91 651	.91 656	.91 661	.91 666	.91 672	.91 677	.91 682	.91 687	.91 693	3
826	698	703	709	714	719	724	730	735	740	745	3
827	751	756	761	766	772	777	782	787	793	798	4
828	803	808	814	819	824	829	834	840	845	850	4
829	855	861	866	871	876	882	887	892	897	903	5
830	.91 908	.91 913	.91 918	.91 924	.91 929	.91 934	.91 939	.91 944	.91 950	.91 955	**6**
831	960	965	971	976	981	986	991	997	**92** 002	92 007	1
832	92 012	92 018	92 023	92 028	92 033	92 038	92 044	92 049	054	059	1
833	065	070	075	080	085	091	096	101	106	111	2
834	117	122	127	132	137	143	148	153	158	163	2
835	.92 169	.92 174	.92 179	.92 184	.92 189	.92 195	.92 200	.92 205	.92 210	.92 215	3
836	221	226	231	236	241	247	252	257	262	267	4
837	273	278	283	288	293	298	304	309	314	319	4
838	324	330	335	340	345	350	355	361	366	371	5
839	376	381	387	392	397	402	407	412	418	423	5
840	.92 428	.92 433	.92 438	.92 443	.92 449	.92 454	.92 459	.92 464	.92 469	.92 474	**5**
841	480	485	490	495	500	505	511	516	521	526	1
842	531	536	542	547	552	557	562	567	572	578	1
843	583	588	593	598	603	609	614	619	624	629	2
844	634	639	645	650	655	660	665	670	675	681	2
845	.92 686	.92 691	.92 696	.92 701	.92 706	.92 711	.92 716	.92 722	.92 727	.92 732	3
846	737	742	747	752	758	763	768	773	778	783	3
847	788	793	799	804	809	814	819	824	829	834	4
848	840	845	850	855	860	865	870	875	881	886	4
849	891	896	901	906	911	916	921	927	932	937	5
850	.92 942	.92 947	.92 952	.92 957	.92 962	.92 967	.92 973	.92 978	.92 983	.92 988	
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850	.92 942	.92 947	.92 952	.92 957	.92 962	.92 967	.92 973	.92 978	.92 983	.92 988	**6**
851	993	998	**93** 003	93 008	93 013	93 018	93 024	93 029	93 034	93 039	1
852	93 044	93 049	054	059	064	069	075	080	085	090	1
853	095	100	105	110	115	120	125	131	136	141	2
854	146	151	156	161	166	171	176	181	186	192	2
855	.93 197	.93 202	.93 207	.93 212	.93 217	.93 222	.93 227	.93 232	.93 237	.93 242	3
856	247	252	258	263	268	273	278	283	288	293	4
857	298	303	308	313	318	323	328	334	339	344	4
858	349	354	359	364	369	374	379	384	389	394	5
859	399	404	409	414	420	425	430	435	440	445	5
860	.93 450	.93 455	.93 460	.93 465	.93 470	.93 475	.93 480	.93 485	.93 490	.93 495	**5**
861	500	505	510	515	520	526	531	536	541	546	1
862	551	556	561	566	571	576	581	586	591	596	1
863	601	606	611	616	621	626	631	636	641	646	2
864	651	656	661	666	671	676	682	687	692	697	2
865	.93 702	.93 707	.93 712	.93 717	.93 722	.93 727	.93 732	.93 737	.93 742	.93 747	3
866	752	757	762	767	772	777	782	787	792	797	3
867	802	807	812	817	822	827	832	837	842	847	4
868	852	857	862	867	872	877	882	887	892	897	4
869	902	907	912	917	922	927	932	937	942	947	5
870	.93 952	.93 957	.93 962	.93 967	.93 972	.93 977	.93 982	.93 987	.93 992	.93 997	**4**
871	**94** 002	94 007	94 012	94 017	94 022	94 027	94 032	94 037	94 042	94 047	0
872	052	057	062	067	072	077	082	086	091	096	1
873	101	106	111	116	121	126	131	136	141	146	1
874	151	156	161	166	171	176	181	186	191	196	2
875	.94 201	.94 206	.94 211	.94 216	.94 221	.94 226	.94 231	.94 236	.94 240	.94 245	2
876	250	255	260	265	270	275	280	285	290	295	2
877	300	305	310	315	320	325	330	335	340	345	3
878	349	354	359	364	369	374	379	384	389	394	3
879	399	404	409	414	419	424	429	433	438	443	4
880	.94 448	.94 453	.94 458	.94 463	.94 468	.94 473	.94 478	.94 483	.94 488	.94 493	**5**
881	498	503	507	512	517	522	527	532	537	542	1
882	547	552	557	562	567	571	576	581	586	591	1
883	596	601	606	611	616	621	626	630	635	640	2
884	645	650	655	660	665	670	675	680	685	689	2
885	.94 694	.94 699	.94 704	.94 709	.94 714	.94 719	.94 724	.94 729	.94 734	.94 738	3
886	743	748	753	758	763	768	773	778	783	787	3
887	792	797	802	807	812	817	822	827	832	836	4
888	841	846	851	856	861	866	871	876	880	885	4
889	890	895	900	905	910	915	919	924	929	934	5
890	.94 939	.94 944	.94 949	.94 954	.94 959	.94 963	.94 968	.94 973	.94 978	.94 983	**4**
891	988	993	998	**95** 002	95 007	95 012	95 017	95 022	95 027	95 032	0
892	95 036	95 041	95 046	051	056	061	066	071	075	080	1
893	085	090	095	100	105	109	114	119	124	129	1
894	134	139	143	148	153	158	163	168	173	177	2
895	.95 182	.95 187	.95 192	.95 197	.95 202	.95 207	.95 211	.95 216	.95 221	.95 226	2
896	231	236	240	245	250	255	260	265	270	274	2
897	279	284	289	294	299	303	308	313	318	323	3
898	328	332	337	342	347	352	357	361	366	371	3
899	376	381	386	390	395	400	405	410	415	419	4
900	.95 424	.95 429	.95 434	.95 439	.95 444	.95 448	.95 453	.95 458	.95 463	.95 468	
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900	.95 424	.95 429	.95 434	.95 439	.95 444	.95 448	.95 453	.95 458	.95 463	.95 468	**5**
901	472	477	482	487	492	497	501	506	511	516	1
902	521	525	530	535	540	545	550	554	559	564	1
903	569	574	578	583	588	593	598	602	607	612	2
904	617	622	626	631	636	641	646	650	655	660	2
905	.95 665	.95 670	.95 674	.95 679	.95 684	.95 689	.95 694	.95 698	.95 703	.95 708	3
906	713	718	722	727	732	737	742	746	751	756	3
907	761	766	770	775	780	785	789	794	799	804	4
908	809	813	818	823	828	832	837	842	847	852	4
909	856	861	866	871	875	880	885	890	895	899	5
910	.95 904	.95 909	.95 914	.95 918	.95 923	.95 928	.95 933	.95 938	.95 942	.95 947	**4**
911	952	957	961	966	971	976	980	985	990	995	0
912	999	**96** 004	96 009	96 014	96 019	96 023	96 028	96 033	96 038	96 042	1
913	96 047	052	057	061	066	071	076	080	085	090	1
914	095	099	104	109	114	118	123	128	133	137	2
915	.96 142	.96 147	.96 152	.96 156	.96 161	.96 166	.96 171	.96 175	.96 180	.96 185	2
916	190	194	199	204	209	213	218	223	227	232	2
917	237	242	246	251	256	261	265	270	275	280	3
918	284	289	294	298	303	308	313	317	322	327	3
919	332	336	341	346	350	355	360	365	369	374	4
920	.96 379	.96 384	.96 388	.96 393	.96 398	.96 402	.96 407	.96 412	.96 417	.96 421	**5**
921	426	431	435	440	445	450	454	459	464	468	1
922	473	478	483	487	492	497	501	506	511	515	1
923	520	525	530	534	539	544	548	553	558	562	2
924	567	572	577	581	586	591	595	600	605	609	2
925	.96 614	.96 619	.96 624	.96 628	.96 633	.96 638	.96 642	.96 647	.96 652	.96 656	3
926	661	666	670	675	680	685	689	694	699	703	3
927	708	713	717	722	727	731	736	741	745	750	4
928	755	759	764	769	774	778	783	788	792	797	4
929	802	806	811	816	820	825	830	834	839	844	5
930	.96 848	.96 853	.96 858	.96 862	.96 867	.96 872	.96 876	.96 881	.96 886	.96 890	**4**
931	895	900	904	909	914	918	923	928	932	937	0
932	942	946	951	956	960	965	970	974	979	984	1
933	988	993	997	**97** 002	97 007	97 011	97 016	97 021	97 025	97 030	1
934	97 035	97 039	97 044	049	053	058	063	067	072	077	2
935	.97 081	.97 086	.97 090	.97 095	.97 100	.97 104	.97 109	.97 114	.97 118	.97 123	2
936	128	132	137	142	146	151	155	160	165	169	2
937	174	179	183	188	192	197	202	206	211	216	3
938	220	225	230	234	239	243	248	253	257	262	3
939	267	271	276	280	285	290	294	299	304	308	4
940	.97 313	.97 317	.97 322	.97 327	.97 331	.97 336	.97 340	.97 345	.97 350	.97 354	**5**
941	359	364	368	373	377	382	387	391	396	400	1
942	405	410	414	419	424	428	433	437	442	447	1
943	451	456	460	465	470	474	479	483	488	493	2
944	497	502	506	511	516	520	525	529	534	539	2
945	.97 543	.97 548	.97 552	.97 557	.97 562	.97 566	.97 571	.97 575	.97 580	.97 585	3
946	589	594	598	603	607	612	617	621	626	630	3
947	635	640	644	649	653	658	663	667	672	676	4
948	681	685	690	695	699	704	708	713	717	722	4
949	727	731	736	740	745	749	754	759	763	768	5
950	.97 772	.97 777	.97 782	.97 786	.97 791	.97 795	.97 800	.97 804	.97 809	.97 813	
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7 .84 510

8 .90 309

9 .95 424 .99 996

N	0	1	2	3	4	5	6	7	8	9	Dif.
950	.97 772	.97 777	.97 782	.97 786	.97 791	.97 795	.97 800	.97 804	.97 809	.97 813	**4**
951	818	823	827	832	836	841	845	850	855	859	0
952	864	868	873	877	882	886	891	896	900	905	1
953	909	914	918	923	928	932	937	941	946	950	1
954	955	959	964	968	973	978	982	987	991	996	2
955	**.98** 000	.98 005	.98 009	.98 014	.98 019	.98 023	.98 028	.98 032	.98 037	.98 041	2
956	046	050	055	059	064	068	073	078	082	087	2
957	091	096	100	105	109	114	118	123	127	132	3
958	137	141	146	150	155	159	164	168	173	177	3
959	182	186	191	195	200	204	209	214	218	223	4
960	.98 227	.98 232	.98 236	.98 241	.98 245	.98 250	.98 254	.98 259	.98 263	.98 268	**5**
961	272	277	281	286	290	295	299	304	308	313	1
962	318	322	327	331	336	340	345	349	354	358	1
963	363	367	372	376	381	385	390	394	399	403	2
964	408	412	417	421	426	430	435	439	444	448	2
965	.98 453	.98 457	.98 462	.98 466	.98 471	.98 475	.98 480	.98 484	.98 489	.98 493	3
966	498	502	507	511	516	520	525	529	534	538	3
967	543	547	552	556	561	565	570	574	579	583	4
968	588	592	597	601	605	610	614	619	623	628	4
969	632	637	641	646	650	655	659	664	668	673	5
970	.98 677	.98 682	.98 686	.98 691	.98 695	.98 700	.98 704	.98 709	.98 713	.98 717	**4**
971	722	726	731	735	740	744	749	753	758	762	0
972	767	771	776	780	784	789	793	798	802	807	1
973	811	816	820	825	829	834	838	843	847	851	1
974	856	860	865	869	874	878	883	887	892	896	2
975	.98 900	.98 905	.98 909	.98 914	.98 918	.98 923	.98 927	.98 932	.98 936	.98 941	2
976	945	949	954	958	963	967	972	976	981	985	2
977	989	994	998	**99** 003	99 007	99 012	99 016	99 021	99 025	99 029	3
978	99 034	99 038	99 043	047	052	056	061	065	069	074	3
979	078	083	087	092	096	100	105	109	114	118	4
980	.99 123	.99 127	.99 131	.99 136	.99 140	.99 145	.99 149	.99 154	.99 158	.99 162	**5**
981	167	171	176	180	185	189	193	198	202	207	1
982	211	216	220	224	229	233	238	242	247	251	1
983	255	260	264	269	273	277	282	286	291	295	2
984	300	304	308	313	317	322	326	330	335	339	2
985	.99 344	.99 348	.99 352	.99 357	.99 361	.99 366	.99 370	.99 374	.99 379	.99 383	3
986	388	392	396	401	405	410	414	419	423	427	3
987	432	436	441	445	449	454	458	463	467	471	4
988	476	480	484	489	493	498	502	506	511	515	4
989	520	524	528	533	537	542	546	550	555	559	5
990	.99 564	.99 568	.99 572	.99 577	.99 581	.99 585	.99 590	.99 594	.99 599	.99 603	**4**
991	607	612	616	621	625	629	634	638	642	647	0
992	651	656	660	664	669	673	677	682	686	691	1
993	695	699	704	708	712	717	721	726	730	734	1
994	739	743	747	752	756	760	765	769	774	778	2
995	.99 782	.99 787	.99 791	.99 795	.99 800	.99 804	.99 808	.99 813	.99 817	.99 822	2
996	826	830	835	839	843	848	852	856	861	865	2
997	870	874	878	883	887	891	896	900	904	909	3
998	913	917	922	926	930	935	939	944	948	952	3
999	957	961	965	970	974	978	983	987	991	996	4
1000	.00 000	.00 004	.00 009	.00 013	.00 017	.00 022	.00 026	.00 030	.00 035	.00 039	
N	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	

N	0	1	2	3	4	5	6	7	8	9
1000	.00 000	.00 004	.00 009	.00 013	.00 017	.00 022	.00 026	.00 030	.00 035	.00 039
01	043	048	052	056	061	065	069	074	078	082
02	087	091	095	100	104	108	113	117	121	126
03	130	134	139	143	147	152	156	160	165	169
04	173	178	182	186	191	195	199	204	208	212
05	.00 217	.00 221	.00 225	.00 230	.00 234	.00 238	.00 243	.00 247	.00 251	.00 255
06	260	264	268	273	277	281	286	290	294	299
07	303	307	312	316	320	325	329	333	337	342
08	346	350	355	359	363	368	372	376	381	385
09	389	393	398	402	406	411	415	419	424	428
1010	.00 432	.00 436	.00 441	.00 445	.00 449	.00 454	.00 458	.00 462	.00 467	.00 471
11	475	479	484	488	492	497	501	505	509	514
12	518	522	527	531	535	540	544	548	552	557
13	561	565	570	574	578	582	587	591	595	600
14	604	608	612	617	621	625	629	634	638	642
15	.00 647	.00 651	.00 655	.00 659	.00 664	.00 668	.00 672	.00 677	.00 681	.00 685
16	689	694	698	702	706	711	715	719	724	728
17	732	736	741	745	749	753	758	762	766	771
18	775	779	783	788	792	796	800	805	809	813
19	817	822	826	830	834	839	843	847	852	856
1020	.00 860	.00 864	.00 869	.00 873	.00 877	.00 881	.00 886	.00 890	.00 894	.00 898
21	903	907	911	915	920	924	928	932	937	941
22	945	949	954	958	962	966	971	975	979	983
23	988	992	996	**01** 000	01 005	01 009	01 013	01 017	01 022	01 026
24	01 030	01 034	01 038	043	047	051	055	060	064	068
25	.01 072	.01 077	.01 081	.01 085	.01 089	.01 094	.01 098	.01 102	.01 106	.01 111
26	115	119	123	127	132	136	140	144	149	153
27	157	161	166	170	174	178	182	187	191	195
28	199	204	208	212	216	220	225	229	233	237
29	242	246	250	254	258	263	267	271	275	280
1030	.01 284	.01 288	.01 292	.01 296	.01 301	.01 305	.01 309	.01 313	.01 317	.01 322
31	326	330	334	339	343	347	351	355	360	364
32	368	372	376	381	385	389	393	397	402	406
33	410	414	418	423	427	431	435	439	444	448
34	452	456	460	465	469	473	477	481	486	490
35	.01 494	.01 498	.01 502	.01 507	.01 511	.01 515	.01 519	.01 523	.01 528	.01 532
36	536	540	544	549	553	557	561	565	569	574
37	578	582	586	590	595	599	603	607	611	616
38	620	624	628	632	636	641	645	649	653	657
39	662	666	670	674	678	682	687	691	695	699
1040	.01 703	.01 708	.01 712	.01 716	.01 720	.01 724	.01 728	.01 733	.01 737	.01 741
41	745	749	753	758	762	766	770	774	778	783
42	787	791	795	799	803	808	812	816	820	824
43	828	833	837	841	845	849	853	858	862	866
44	870	874	878	883	887	891	895	899	903	907
45	.01 912	.01 916	.01 920	.01 924	.01 928	.01 932	.01 937	.01 941	.01 945	.01 949
46	953	957	961	966	970	974	978	982	986	991
47	995	999	**02** 003	02 007	02 011	02 015	02 020	02 024	02 028	02 032
48	.02 036	02 040	044	049	053	057	061	065	069	073
49	078	082	086	090	094	098	102	107	111	115
1050	.02 119	.02 123	.02 127	.02 131	.02 135	.02 140	.02 144	.02 148	.02 152	.02 156
N	0	1	2	3	4	5	6	7	8	9

N	0	1	2	3	4	5	6	7	8	9
1050	.02 119	.02 123	.02 127	.02 131	.02 135	.02 140	.02 144	.02 148	.02 152	.02 156
51	160	164	169	173	177	181	185	189	193	197
52	202	206	210	214	218	222	226	230	235	239
53	243	247	251	255	259	263	268	272	276	280
54	284	288	292	296	301	305	309	313	317	321
55	.02 325	.02 329	.02 333	.02 338	.02 342	.02 346	.02 350	.02 354	.02 358	.02 362
56	366	371	375	379	383	387	391	395	399	403
57	407	412	416	420	424	428	432	436	440	444
58	449	453	457	461	465	469	473	477	481	485
59	490	494	498	502	506	510	514	518	522	526
1060	.02 531	.02 535	.02 539	.02 543	.02 547	.02 551	.02 555	.02 559	.02 563	.02 567
61	572	576	580	584	588	592	596	600	604	608
62	612	617	621	625	629	633	637	641	645	649
63	653	657	661	666	670	674	678	682	686	690
64	694	698	702	706	710	715	719	723	727	731
65	.02 735	.02 739	.02 743	.02 747	.02 751	.02 755	.02 759	.02 763	.02 768	.02 772
66	776	780	784	788	792	796	800	804	808	812
67	816	821	825	829	833	837	841	845	849	853
68	857	861	865	869	873	877	882	886	890	894
69	898	902	906	910	914	918	922	926	930	934
1070	.02 938	.02 942	.02 946	.02 951	.02 955	.02 959	.02 963	.02 967	.02 971	.02 975
71	979	983	987	991	995	999	**03** 003	03 007	03 011	03 015
72	03 019	03 024	03 028	03 032	03 036	03 040	044	048	052	056
73	060	064	068	072	076	080	084	088	092	096
74	100	104	109	113	117	121	125	129	133	137
75	.03 141	.03 145	.03 149	.03 153	.03 157	.03 161	.03 165	.03 169	.03 173	.03 177
76	181	185	189	193	197	201	205	209	214	218
77	222	226	230	234	238	242	246	250	254	258
78	262	266	270	274	278	282	286	290	294	298
79	302	306	310	314	318	322	326	330	334	338
1080	.03 342	.03 346	.03 350	.03 354	.03 358	.03 362	.03 366	.03 371	.03 375	.03 379
81	383	387	391	395	399	403	407	411	415	419
82	423	427	431	435	439	443	447	451	455	459
83	463	467	471	475	479	483	487	491	495	499
84	503	507	511	515	519	523	527	531	535	539
85	.03 543	.03 547	.03 551	.03 555	.03 559	.03 563	.03 567	.03 571	.03 575	.03 579
86	583	587	591	595	599	603	607	611	615	619
87	623	627	631	635	639	643	647	651	655	659
88	663	667	671	675	679	683	687	691	695	699
89	703	707	711	715	719	723	727	731	735	739
1090	.03 743	.03 747	.03 751	.03 755	.03 759	.03 763	.03 767	.03 771	.03 775	.03 778
91	782	786	790	794	798	802	806	810	814	818
92	822	826	830	834	838	842	846	850	854	858
93	862	866	870	874	878	882	886	890	894	898
94	902	906	910	914	918	922	926	930	933	937
95	.03 941	.03 945	.03 949	.03 953	.03 957	.03 961	.03 965	.03 969	.03 973	.03 977
96	981	985	989	993	997	**04** 001	04 005	04 009	04 013	04 017
97	04 021	04 025	04 029	04 033	04 036	040	044	048	052	056
98	060	064	068	072	076	080	084	088	092	096
99	100	104	108	112	116	120	123	127	131	135
1100	.04 139	.04 143	.04 147	.04 151	.04 155	.04 159	.04 163	.04 167	.04 171	.04 175
N	0	1	2	3	4	5	6	7	8	9

TABLE II

IMPORTANT CONSTANTS AND THEIR COMMON LOGARITHMS

		Common Logarithms
The circumference of a circle	= 360°	2. 55 630 250
	= 21 600′	4. 33 445 375
	= 1 296 000″	6. 11 260 500
π = 3. 14 159 265 358 979 323 846 264 338 328		0. 49 714 987
π^2	= 9. 86 960 440 . . .	0. 99 429 975
$1/\pi$	= 0. 31 830 989 . . .	$\bar{1}$. 50 285 013
$1/\pi^2$	= 0. 10 132 118 . . .	$\bar{1}$. 00 570 025
$\sqrt{\pi}$	= 1. 77 245 385 . . .	0. 24 857 494
$1/\sqrt{\pi}$	= 0. 56 418 958 . . .	$\bar{1}$. 75 142 506
$\sqrt{(3/\pi)}$	= 0. 97 720 502 . . .	$\bar{1}$. 98 998 569
$\sqrt{(4/\pi)}$	= 1. 12 837 917 . . .	0. 05 245 506
$\sqrt[3]{\pi}$	= 1. 46 459 189 . . .	0. 16 571 662
$1/\sqrt[3]{\pi}$	= 0. 68 278 406 . . .	$\bar{1}$. 83 428 338
1 radian = $180°/\pi$	= 57. 29 577 951° . .	1. 75 812 263
	= 3 437. 74 677′ . . .	3. 53 627 388
	= 206 264. 806″ . . .	5. 31 442 513
In terms of a radian	1° = 0. 01 745 329 . . .	$\bar{2}$. 24 187 737
	1′ = 0. 00 029 089 . . .	$\bar{4}$. 46 372 612
	1″ = 0. 00 000 485 . . .	$\bar{6}$. 68 557 487
Base of natural logarithms = ϵ	= 2. 71 828 183 . . .	0. 43 429 448
Modulus of common logarithms = $\log_{10}\epsilon$.	= 0. 43 429 448 . . .	$\bar{1}$. 63 778 431
Factor by which to multiply common logs, to obtain natural logs, or $1/\log_{10}\epsilon$ . .	= 2. 30 258 5	0. 36 221 57
1 meter	= 39.37 inches . . .	1. 59 516 54
	= 1.09 361 1 yard . .	0. 03 886 29
	= 3.28 083 3 feet . .	0. 51 598 42
1 kilometer	= 0.62 137 0 mile . .	$\bar{1}$. 79 335 03
1 mile	= 1.60 934 7 kilom. .	0. 20 664 97
1 yard	= 0.91 440 2 metre . .	$\bar{1}$. 96 113 71
1 foot	= 0.30 480 1 metre . .	$\bar{1}$. 48 401 58
1 inch	= 25.40 005 mm. . .	1. 40 483 46
1 pound Av.	= 7000 grains . . .	3. 84 509 80
	= 453.59 242 77 grammes	2. 65 666 58
1 ounce Av.	= 28.34 953 grammes .	1. 45 254 59
1 ounce Troy	= 31.10 348 grammes .	1. 49 280 91
1 grain	= 0.06 479 892 gramme	$\bar{2}$. 81 156 78
1 kilogramme	= 2.20 462 2 pounds Av.	0. 34 333 42
1 gramme	= 15.43 235 639 grains	1. 18 843 22
1 litre	= 1.05 668 U. S. quart	0. 02 394 4
	= 0.26 417 U. S. gallon	$\bar{1}$. 42 188 4
	= 33.814 U. S. fluid oz.	1. 52 910
1 quart, U. S.	= 0.94 636 litre . . .	$\bar{1}$. 97 605 6
1 gallon, U. S.	= 3.78 544 litres . . .	0. 57 811 6
1 fluid ounce	= 0.02 957 3 litre . .	$\bar{2}$. 47 090
1 gallon U. S.	= 231 cu. inches . .	2. 36 361 20
1 British gallon	= 4.54 346 litres . . .	0. 65 738 67
1 British bushel	= 36.34 77 litres . . .	1. 56 047 69

TABLE III

THE COMMON LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS OF ANGLES

From 1° to 89°

FOR EVERY MINUTE

FIVE-PLACE MANTISSAS

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

1°

′	log sin	log tan	log cot	log cos	′
	8–10	8–10	1	9–10	
0	.24 186	.24 192	.75 808	.99 993	60
1	903	910	090	993	59
2	25 609	25 616	74 384	993	58
3	26 304	26 312	73 688	993	57
4	988	996	004	992	56
5	.27 661	.27 669	.72 331	.99 992	55
6	28 324	28 332	71 668	992	54
7	977	986	014	992	53
8	29 621	29 629	70 371	992	52
9	30 255	30 263	69 737	991	51
10	.30 879	.30 888	.69 112	.99 991	50
11	31 495	31 505	68 495	991	49
12	32 103	32 112	67 888	990	48
13	702	711	289	990	47
14	33 292	33 302	66 698	990	46
15	.33 875	.33 886	.66 114	.99 990	45
16	34 450	34 461	65 539	989	44
17	35 018	35 029	64 971	989	43
18	578	590	410	989	42
19	36 131	36 143	63 857	989	41
20	.36 678	.36 689	.63 311	.99 988	40
21	37 217	37 229	62 771	988	39
22	750	762	238	988	38
23	38 276	38 289	61 711	987	37
24	796	809	191	987	36
25	.39 310	.39 323	.60 677	.99 987	35
26	818	832	168	986	34
27	40 320	40 334	59 666	986	33
28	816	830	170	986	32
29	41 307	41 321	58 679	985	31
30	.41 792	.41 807	.58 193	.99 985	30
31	42 272	42 287	57 713	985	29
32	746	762	238	984	28
33	43 216	43 232	56 768	984	27
34	680	696	304	984	26
35	.44 139	.44 156	.55 844	.99 983	25
36	594	611	389	983	24
37	45 044	45 061	54 939	983	23
38	489	507	493	982	22
39	930	948	052	982	21
40	.46 366	.46 385	.53 615	.99 982	20
41	799	817	183	981	19
42	47 226	47 245	52 755	981	18
43	650	669	331	981	17
44	48 069	48 089	51 911	980	16
45	.48 485	.48 505	.51 495	.99 980	15
46	896	917	083	979	14
47	49 304	49 325	50 675	979	13
48	708	729	271	979	12
49	50 108	50 130	49 870	978	11
50	.50 504	.50 527	.49 473	.99 978	10
51	897	920	080	977	9
52	51 287	51 310	48 690	977	8
53	673	696	304	977	7
54	52 055	52 079	47 921	976	6
55	.52 434	.52 459	.47 541	.99 976	5
56	810	835	165	975	4
57	53 183	53 208	46 792	975	3
58	552	578	422	974	2
59	919	945	055	974	1
60	.54 282	.54 308	.45 692	.99 974	0
	8–10	8–10	1	9–10	
′	log cos	log cot	log tan	log sin	′

88°

2°

′	log sin	log tan	log cot	log cos	′
	8–10	8–10	1	9–10	
0	.54 282	.54 308	.45 692	.99 974	60
1	642	669	331	973	59
2	999	55 027	44 973	973	58
3	55 354	382	618	972	57
4	705	734	266	972	56
5	.56 054	.56 083	.43 917	.99 971	55
6	400	429	571	971	54
7	743	773	227	970	53
8	57 084	57 114	42 886	970	52
9	421	452	548	969	51
10	.57 757	.57 788	.42 212	.99 969	50
11	58 089	58 121	41 879	968	49
12	419	451	549	968	48
13	747	779	221	967	47
14	59 072	59 105	40 895	967	46
15	.59 395	.59 428	.40 572	.99 967	45
16	715	749	251	966	44
17	60 033	60 068	39 932	966	43
18	349	384	616	965	42
19	662	698	302	964	41
20	.60 973	.61 009	.38 991	.99 964	40
21	61 282	319	681	963	39
22	589	626	374	963	38
23	894	931	069	962	37
24	62 196	62 234	37 766	962	36
25	.62 497	.62 535	.37 465	.99 961	35
26	795	834	166	961	34
27	63 091	63 131	36 869	960	33
28	385	426	574	960	32
29	678	718	282	959	31
30	.63 968	.64 009	.35 991	.99 959	30
31	64 256	298	702	958	29
32	543	585	415	958	28
33	827	870	130	957	27
34	65 110	65 154	34 846	956	26
35	.65 391	.65 435	.34 565	.99 956	25
36	670	715	285	955	24
37	947	993	007	955	23
38	66 223	66 269	33 731	954	22
39	497	543	457	954	21
40	.66 769	.66 816	.33 184	.99 953	20
41	67 039	67 087	32 913	952	19
42	308	356	644	952	18
43	575	624	376	951	17
44	841	890	110	951	16
45	.68 104	.68 154	.31 846	.99 950	15
46	367	417	583	949	14
47	627	678	322	949	13
48	886	938	062	948	12
49	69 144	69 196	30 804	948	11
50	.69 400	.69 453	.30 547	.99 947	10
51	654	708	292	946	9
52	907	962	038	946	8
53	70 159	70 214	29 786	945	7
54	409	465	535	944	6
55	.70 658	.70 714	.29 286	.99 944	5
56	905	962	038	943	4
57	71 151	71 208	28 792	942	3
58	395	453	547	942	2
59	638	697	303	941	1
60	.71 880	.71 940	.28 060	.99 940	0
	8–10	8–10	1	9–10	
′	log cos	log cot	log tan	log sin	′

87°

3°

′	log sin	log tan	log cot	log cos	′
	8–10	8–10	1	9–10	
0	.71 880	.71 940	.28 060	.99 940	60
1	72 120	72 181	27 819	940	59
2	359	420	580	939	58
3	597	659	341	938	57
4	834	896	104	938	56
5	.73 069	.73 132	.26 868	.99 937	55
6	303	366	634	936	54
7	535	600	400	936	53
8	767	832	168	935	52
9	997	74 063	25 937	934	51
10	.74 226	.74 292	.25 708	.99 934	50
11	454	521	479	933	49
12	680	748	252	932	48
13	906	974	026	932	47
14	75 130	75 199	24 801	931	46
15	.75 353	.75 423	.24 577	.99 930	45
16	575	645	355	929	44
17	795	867	133	929	43
18	76 015	76 087	23 913	928	42
19	234	306	694	927	41
20	.76 451	.76 525	.23 475	.99 926	40
21	667	742	258	926	39
22	883	958	042	925	38
23	77 097	77 173	22 827	924	37
24	310	387	613	923	36
25	.77 522	.77 600	.22 400	.99 923	35
26	733	811	189	922	34
27	943	78 022	21 978	921	33
28	78 152	232	768	920	32
29	360	441	559	920	31
30	.78 568	.78 649	.21 351	.99 919	30
31	774	855	145	918	29
32	979	79 061	20 939	917	28
33	79 183	266	734	917	27
34	386	470	530	916	26
35	.79 588	.79 673	.20 327	.99 915	25
36	789	875	125	914	24
37	990	80 076	19 924	913	23
38	80 189	277	723	913	22
39	388	476	524	912	21
40	.80 585	.80 674	.19 326	.99 911	20
41	782	872	128	910	19
42	978	81 068	18 932	909	18
43	81 173	264	736	909	17
44	367	459	541	908	16
45	.81 560	.81 653	.18 347	.99 907	15
46	752	846	154	906	14
47	944	82 038	17 962	905	13
48	82 134	230	770	904	12
49	324	420	580	904	11
50	.82 513	.82 610	.17 390	.99 903	10
51	701	799	201	902	9
52	888	987	013	901	8
53	83 075	83 175	16 825	900	7
54	261	361	639	899	6
55	.83 446	.83 547	.16 453	.99 898	5
56	630	732	268	898	4
57	813	916	084	897	3
58	996	84 100	15 900	896	2
59	84 177	282	718	895	1
60	.84 358	.84 464	.15 536	.99 894	0
	8–10	8–10	1	9–10	
′	log cos	log cot	log tan	log sin	′

86°

4°

′	log sin	log tan	log cot	log cos	′
	8–10	8–10	1	9–10	
0	.84 358	.84 464	.15 536	.99 894	60
1	539	646	354	893	59
2	718	826	174	892	58
3	897	85 006	14 994	891	57
4	85 075	185	815	891	56
5	.85 252	.85 363	.14 637	.99 890	55
6	429	540	460	889	54
7	605	717	283	888	53
8	780	893	107	887	52
9	955	86 069	13 931	886	51
10	.86 128	.86 243	.13 757	.99 885	50
11	301	417	583	884	49
12	474	591	409	883	48
13	645	763	237	882	47
14	816	935	065	881	46
15	.86 987	.87 106	.12 894	.99 880	45
16	87 156	277	723	879	44
17	325	447	553	879	43
18	494	616	384	878	42
19	661	785	215	877	41
20	.87 829	.87 953	.12 047	.99 876	40
21	995	88 120	11 880	875	39
22	88 161	287	713	874	38
23	326	453	547	873	37
24	490	618	382	872	36
25	.88 654	.88 783	.11 217	.99 871	35
26	817	948	052	870	34
27	980	89 111	10 889	869	33
28	89 142	274	726	868	32
29	304	437	563	867	31
30	.89 464	.89 598	.10 402	.99 866	30
31	625	760	240	865	29
32	784	920	080	864	28
33	943	90 080	09 920	863	27
34	90 102	240	760	862	26
35	.90 260	.90 399	.09 601	.99 861	25
36	417	557	443	860	24
37	574	715	285	859	23
38	730	872	128	858	22
39	885	91 029	08 971	857	21
40	.91 040	.91 185	.08 815	.99 856	20
41	195	340	660	855	19
42	349	495	505	854	18
43	502	650	350	853	17
44	655	803	197	852	16
45	.91 807	.91 957	.08 043	.99 851	15
46	959	92 110	07 890	850	14
47	92 110	262	738	848	13
48	261	414	586	847	12
49	411	565	435	846	11
50	.92 561	.92 716	.07 284	.99 845	10
51	710	866	134	844	9
52	859	93 016	06 984	843	8
53	93 007	165	835	842	7
54	154	313	687	841	6
55	.93 301	.93 462	.06 538	.99 840	5
56	448	609	391	839	4
57	594	756	244	838	3
58	740	903	097	837	2
59	885	94 049	05 951	836	1
60	.94 030	.94 195	.05 805	.99 834	0
	8–10	8–10	1	9–10	
′	log cos	log cot	log tan	log sin	′

85°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462
81°-84°

5°

′	log sin	log tan	log cot	log cos	′
	8-10	8-10	1	9-10	
0	.94 030	.94 195	.05 805	.99 834	60
1	174	340	660	833	59
2	317	485	515	832	58
3	461	630	370	831	57
4	603	773	227	830	56
5	.94 746	.94 917	.05 083	.99 829	55
6	887	95 060	04 940	828	54
7	95 029	202	798	827	53
8	170	344	656	825	52
9	310	486	514	824	51
10	.95 450	.95 627	.04 373	.99 823	50
11	589	767	233	822	49
12	728	908	092	821	48
13	867	96 047	03 953	820	47
14	96 005	187	813	819	46
15	.96 143	.96 325	.03 675	.99 817	45
16	280	464	536	816	44
17	417	602	398	815	43
18	553	739	261	814	42
19	689	877	123	813	41
20	.96 825	.97 013	.02 987	.99 812	40
21	960	150	850	810	39
22	97 095	285	715	809	38
23	229	421	579	808	37
24	363	556	444	807	36
25	.97 496	.97 691	.02 309	.99 806	35
26	629	825	175	804	34
27	762	959	041	803	33
28	894	98 092	01 908	802	32
29	98 026	225	775	801	31
30	.98 157	.98 358	.01 642	.99 800	30
31	288	490	510	798	29
32	419	622	378	797	28
33	549	753	247	796	27
34	679	884	116	795	26
35	.98 808	.99 015	.00 985	.99 793	25
36	937	145	855	792	24
37	99 066	275	725	791	23
38	194	405	595	790	22
39	322	534	466	788	21
40	.99 450	.99 662	.00 338	.99 787	20
41	577	791	209	786	19
42	704	919	081	785	18
43	830	00 046	99 954	783	17
44	956	174	826	782	16
45	.00 082	.00 301	.99 699	.99 781	15
46	207	427	573	780	14
47	332	553	447	778	13
48	456	679	321	777	12
49	581	805	195	776	11
50	.00 704	.00 930	.99 070	.99 775	10
51	828	01 055	98 945	773	9
52	951	179	821	772	8
53	01 074	303	697	771	7
54	196	427	573	769	6
55	.01 318	.01 550	.98 450	.99 768	5
56	440	673	327	767	4
57	561	796	204	765	3
58	682	918	082	764	2
59	803	02 040	97 960	763	1
60	.01 923	.02 162	.97 838	.99 761	0
	9-10	9-10	0	9-10	
′	log cos	log cot	log tan	log sin	′

84°

6°

′	log sin	log tan	log cot	log cos	′
	9-10	9-10	0	9-10	
0	.01 923	.02 162	.97 838	.99 761	60
1	02 043	283	717	760	59
2	163	404	596	759	58
3	283	525	475	757	57
4	402	645	355	756	56
5	.02 520	.02 766	.97 234	.99 755	55
6	639	885	115	753	54
7	757	03 005	96 995	752	53
8	874	124	876	751	52
9	992	242	758	749	51
10	.03 109	.03 361	.96 639	.99 748	50
11	226	479	521	747	49
12	342	597	403	745	48
13	458	714	286	744	47
14	574	832	168	742	46
15	.03 690	.03 948	.96 052	.99 741	45
16	805	04 065	95 935	740	44
17	920	181	819	738	43
18	04 034	297	703	737	42
19	149	413	587	736	41
20	.04 262	.04 528	.95 472	.99 734	40
21	376	643	357	733	39
22	490	758	242	731	38
23	603	873	127	730	37
24	715	987	013	728	36
25	.04 828	.05 101	.94 899	.99 727	35
26	940	214	786	726	34
27	05 052	328	672	724	33
28	164	441	559	723	32
29	275	553	447	721	31
30	.05 386	.05 666	.94 334	.99 720	30
31	497	778	222	718	29
32	607	890	110	717	28
33	717	06 002	93 998	716	27
34	827	113	887	714	26
35	.05 937	.06 224	.93 776	.99 713	25
36	06 046	335	665	711	24
37	155	445	555	710	23
38	264	556	444	708	22
39	372	666	334	707	21
40	.06 481	.06 775	.93 225	.99 705	20
41	589	885	115	704	19
42	696	994	006	702	18
43	804	07 103	92 897	701	17
44	911	211	789	699	16
45	.07 018	.07 320	.92 680	.99 698	15
46	124	428	572	696	14
47	231	536	464	695	13
48	337	643	357	693	12
49	442	751	249	692	11
50	.07 548	.07 858	.92 142	.99 690	10
51	653	964	036	689	9
52	758	08 071	91 929	687	8
53	863	177	823	686	7
54	968	283	717	684	6
55	.08 072	.08 389	.91 611	.99 683	5
56	176	495	505	681	4
57	280	600	400	680	3
58	383	705	295	678	2
59	486	810	190	677	1
60	.08 589	.08 914	.91 086	.99 675	0
	9-10	9-10	0	9-10	
′	log cos	log cot	log tan	log sin	′

83°

7°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.08 589	.08 914	.91 086	.99 675	60
1	692	09 019	90 981	674	59
2	795	123	877	672	58
3	897	227	773	670	57
4	999	330	670	669	56
5	.09 101	.09 434	.90 566	.99 667	55
6	202	537	463	666	54
7	304	640	360	664	53
8	405	742	258	663	52
9	506	845	155	661	51
10	.09 606	.09 947	.90 053	.99 659	50
11	707	10 049	89 951	658	49
12	807	150	850	656	48
13	907	252	748	655	47
14	10 006	353	647	653	46
15	.10 106	.10 454	.89 546	.99 651	45
16	205	555	445	650	44
17	304	656	344	648	43
18	402	756	244	647	42
19	501	856	144	645	41
20	.10 599	.10 956	.89 044	.99 643	40
21	697	11 056	88 944	642	39
22	795	155	845	640	38
23	893	254	746	638	37
24	990	353	647	637	36
25	.11 087	.11 452	.88 548	.99 635	35
26	184	551	449	633	34
27	281	649	351	632	33
28	377	747	253	630	32
29	474	845	155	629	31
30	.11 570	.11 943	.88 057	.99 627	30
31	666	12 040	87 960	625	29
32	761	138	862	624	28
33	857	235	765	622	27
34	952	332	668	620	26
35	.12 047	.12 428	.87 572	.99 618	25
36	142	525	475	617	24
37	236	621	379	615	23
38	331	717	283	613	22
39	425	813	187	612	21
40	.12 519	.12 909	.87 091	.99 610	20
41	612	13 004	86 996	608	19
42	706	099	901	607	18
43	799	194	806	605	17
44	892	289	711	603	16
45	.12 985	.13 384	.86 616	.99 601	15
46	13 078	478	522	600	14
47	171	573	427	598	13
48	263	667	333	596	12
49	355	761	239	595	11
50	.13 447	.13 854	.86 146	.99 593	10
51	539	948	052	591	9
52	630	14 041	85 959	589	8
53	722	134	866	588	7
54	813	227	773	586	6
55	.13 904	.14 320	.85 680	.99 584	5
56	994	412	588	582	4
57	14 085	504	496	581	3
58	175	597	403	579	2
59	266	688	312	577	1
60	.14 356	.14 780	.85 220	.99 575	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

82°

8°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.14 356	.14 780	.85 220	.99 575	60
1	445	872	128	574	59
2	535	963	037	572	58
3	624	15 054	84 946	570	57
4	714	145	855	568	56
5	.14 803	.15 236	.84 764	.99 566	55
6	891	327	673	565	54
7	980	417	583	563	53
8	15 069	508	492	561	52
9	157	598	402	559	51
10	.15 245	.15 688	.84 312	.99 557	50
11	333	777	223	556	49
12	421	867	133	554	48
13	508	956	044	552	47
14	596	16 046	83 954	550	46
15	.15 683	.16 135	.83 865	.99 548	45
16	770	224	776	546	44
17	857	312	688	545	43
18	944	401	599	543	42
19	16 030	489	511	541	41
20	.16 116	.16 577	.83 423	.99 539	40
21	203	665	335	537	39
22	289	753	247	535	38
23	374	841	159	533	37
24	460	928	072	532	36
25	.16 545	.17 016	.82 984	.99 530	35
26	631	103	897	528	34
27	716	190	810	526	33
28	801	277	723	524	32
29	886	363	637	522	31
30	.16 970	.17 450	.82 550	.99 520	30
31	17 055	536	464	518	29
32	139	622	378	517	28
33	223	708	292	515	27
34	307	794	206	513	26
35	.17 391	.17 880	.82 120	.99 511	25
36	474	965	035	509	24
37	558	18 051	81 949	507	23
38	641	136	864	505	22
39	724	221	779	503	21
40	.17 807	.18 306	.81 694	.99 501	20
41	890	391	609	499	19
42	973	475	525	497	18
43	18 055	560	440	495	17
44	137	644	356	494	16
45	.18 220	.18 728	.81 272	.99 492	15
46	302	812	188	490	14
47	383	896	104	488	13
48	465	979	021	486	12
49	547	19 063	80 937	484	11
50	.18 628	.19 146	.80 854	.99 482	10
51	709	229	771	480	9
52	790	312	688	478	8
53	871	395	605	476	7
54	952	478	522	474	6
55	.19 033	.19 561	.80 439	.99 472	5
56	113	643	357	470	4
57	193	725	275	468	3
58	273	807	193	466	2
59	353	889	111	464	1
60	.19 433	.19 971	.80 029	.99 462	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

81°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462

9°-12°
.19 433
.19 971
.63 664
.98 872
77°-80°

9°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.19 433	.19 971	.80 029	.99 462	60
1	513	20 053	79 947	460	59
2	592	134	866	458	58
3	672	216	784	456	57
4	751	297	703	454	56
5	.19 830	.20 378	.79 622	.99 452	55
6	909	459	541	450	54
7	988	540	460	448	53
8	20 067	621	379	446	52
9	145	701	299	444	51
10	.20 223	.20 782	.79 218	.99 442	50
11	302	862	138	440	49
12	380	942	058	438	48
13	458	21 022	78 978	436	47
14	535	102	898	434	46
15	.20 613	.21 182	.78 818	.99 432	45
16	691	261	739	429	44
17	768	341	659	427	43
18	845	420	580	425	42
19	922	499	501	423	41
20	.20 999	.21 578	.78 422	.99 421	40
21	21 076	657	343	419	39
22	153	736	264	417	38
23	229	814	186	415	37
24	306	893	107	413	36
25	.21 382	.21 971	.78 029	.99 411	35
26	458	22 049	77 951	409	34
27	534	127	873	407	33
28	610	205	795	404	32
29	685	283	717	402	31
30	.21 761	.22 361	.77 639	.99 400	30
31	836	438	562	398	29
32	912	516	484	396	28
33	987	593	407	394	27
34	22 062	670	330	392	26
35	.22 137	.22 747	.77 253	.99 390	25
36	211	824	176	388	24
37	286	901	099	385	23
38	361	977	023	383	22
39	435	23 054	76 946	381	21
40	.22 509	.23 130	.76 870	.99 379	20
41	583	206	794	377	19
42	657	283	717	375	18
43	731	359	641	372	17
44	805	435	565	370	16
45	.22 878	.23 510	.76 490	.99 368	15
46	952	586	414	366	14
47	23 025	661	339	364	13
48	098	737	263	362	12
49	171	812	188	359	11
50	.23 244	.23 887	.76 113	.99 357	10
51	317	962	038	355	9
52	390	24 037	75 963	353	8
53	462	112	888	351	7
54	535	186	814	348	6
55	.23 607	.24 261	.75 739	.99 346	5
56	679	335	665	344	4
57	752	410	590	342	3
58	823	484	516	340	2
59	895	558	442	337	1
60	.23 967	.24 632	.75 368	.99 335	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

80°

10°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.23 967	.24 632	.75 368	.99 335	60
1	24 039	706	294	333	59
2	110	779	221	331	58
3	181	853	147	328	57
4	253	926	074	326	56
5	.24 324	.25 000	.75 000	.99 324	55
6	395	073	74 927	322	54
7	466	146	854	319	53
8	536	219	781	317	52
9	607	292	708	315	51
10	.24 677	.25 365	.74 635	.99 313	50
11	748	437	563	310	49
12	818	510	490	308	48
13	888	582	418	306	47
14	958	655	345	304	46
15	.25 028	.25 727	.74 273	.99 301	45
16	098	799	201	299	44
17	168	871	129	297	43
18	237	943	057	294	42
19	307	26 015	73 985	292	41
20	.25 376	.26 086	.73 914	.99 290	40
21	445	158	842	288	39
22	514	229	771	285	38
23	583	301	699	283	37
24	652	372	628	281	36
25	.25 721	.26 443	.73 557	.99 278	35
26	790	514	486	276	34
27	858	585	415	274	33
28	927	655	345	271	32
29	995	726	274	269	31
30	.26 063	.26 797	.73 203	.99 267	30
31	131	867	133	264	29
32	199	937	063	262	28
33	267	27 008	72 992	260	27
34	335	078	922	257	26
35	.26 403	.27 148	.72 852	.99 255	25
36	470	218	782	252	24
37	538	288	712	250	23
38	605	357	643	248	22
39	672	427	573	245	21
40	.26 739	.27 496	.72 504	.99 243	20
41	806	566	434	241	19
42	873	635	365	238	18
43	940	704	296	236	17
44	27 007	773	227	233	16
45	.27 073	.27 842	.72 158	.99 231	15
46	140	911	089	229	14
47	206	980	020	226	13
48	273	28 049	71 951	224	12
49	339	117	883	221	11
50	.27 405	.28 186	.71 814	.99 219	10
51	471	254	746	217	9
52	537	323	677	214	8
53	602	391	609	212	7
54	668	459	541	209	6
55	.27 734	.28 527	.71 473	.99 207	5
56	799	595	405	204	4
57	864	662	338	202	3
58	930	730	270	200	2
59	995	798	202	197	1
60	.28 060	.28 865	.71 135	.99 195	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

79°

11°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.28 060	.28 865	.71 135	.99 195	60
1	125	933	067	192	59
2	190	29 000	000	190	58
3	254	067	70 933	187	57
4	319	134	866	185	56
5	.28 384	.29 201	.70 799	.99 182	55
6	448	268	732	180	54
7	512	335	665	177	53
8	577	402	598	175	52
9	641	468	532	172	51
10	.28 705	.29 535	.70 465	.99 170	50
11	769	601	399	167	49
12	833	668	332	165	48
13	896	734	266	162	47
14	960	800	200	160	46
15	.29 024	.29 866	.70 134	.99 157	45
16	087	932	068	155	44
17	150	998	002	152	43
18	214	30 064	69 936	150	42
19	277	130	870	147	41
20	.29 340	.30 195	.69 805	.99 145	40
21	403	261	739	142	39
22	466	326	674	140	38
23	529	391	609	137	37
24	591	457	543	135	36
25	.29 654	.30 522	.69 478	.99 132	35
26	716	587	413	130	34
27	779	652	348	127	33
28	841	717	283	124	32
29	903	782	218	122	31
30	.29 966	.30 846	.69 154	.99 119	30
31	30 028	911	089	117	29
32	090	975	025	114	28
33	151	31 040	68 960	112	27
34	213	104	896	109	26
35	.30 275	.31 168	.68 832	.99 106	25
36	336	233	767	104	24
37	398	297	703	101	23
38	459	361	639	099	22
39	521	425	575	096	21
40	.30 582	.31 489	.68 511	.99 093	20
41	643	552	448	091	19
42	704	616	384	088	18
43	765	679	321	086	17
44	826	743	257	083	16
45	.30 887	.31 806	.68 194	.99 080	15
46	947	870	130	078	14
47	31 008	933	067	075	13
48	068	996	004	072	12
49	129	32 059	67 941	070	11
50	.31 189	.32 122	.67 878	.99 067	10
51	250	185	815	064	9
52	310	248	752	062	8
53	370	311	689	059	7
54	430	373	627	056	6
55	.31 490	.32 436	.67 564	.99 054	5
56	549	498	502	051	4
57	609	561	439	048	3
58	669	623	377	046	2
59	728	685	315	043	1
60	.31 788	.32 747	.67 253	.99 040	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

78°

12°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.31 788	.32 747	.67 253	.99 040	60
1	847	810	190	038	59
2	907	872	128	035	58
3	966	933	067	032	57
4	32 025	995	005	030	56
5	.32 084	.33 057	.66 943	.99 027	55
6	143	119	881	024	54
7	202	180	820	022	53
8	261	242	758	019	52
9	319	303	697	016	51
10	.32 378	.33 365	.66 635	.99 013	50
11	437	426	574	011	49
12	495	487	513	008	48
13	553	548	452	005	47
14	612	609	391	002	46
15	.32 670	.33 670	.66 330	.99 000	45
16	728	731	269	98 997	44
17	786	792	208	994	43
18	844	853	147	991	42
19	902	913	087	989	41
20	.32 960	.33 974	.66 026	.98 986	40
21	33 018	34 034	65 966	983	39
22	075	095	905	980	38
23	133	155	845	978	37
24	190	215	785	975	36
25	.33 248	.34 276	.65 724	.98 972	35
26	305	336	664	969	34
27	362	396	604	967	33
28	420	456	544	964	32
29	477	516	484	961	31
30	.33 534	.34 576	.65 424	.98 958	30
31	591	635	365	955	29
32	647	695	305	953	28
33	704	755	245	950	27
34	761	814	186	947	26
35	.33 818	.34 874	.65 126	.98 944	25
36	874	933	067	941	24
37	931	992	008	938	23
38	987	35 051	64 949	936	22
39	34 043	111	889	933	21
40	.34 100	.35 170	.64 830	.98 930	20
41	156	229	771	927	19
42	212	288	712	924	18
43	268	347	653	921	17
44	324	405	595	919	16
45	.34 380	.35 464	.64 536	.98 916	15
46	436	523	477	913	14
47	491	581	419	910	13
48	547	640	360	907	12
49	602	698	302	904	11
50	.34 658	.35 757	.64 243	.98 901	10
51	713	815	185	898	9
52	769	873	127	896	8
53	824	931	069	893	7
54	879	989	011	890	6
55	.34 934	.36 047	.63 953	.98 887	5
56	989	105	895	884	4
57	35 044	163	837	881	3
58	099	221	779	878	2
59	154	279	721	875	1
60	.35 209	.36 336	.63 664	.98 872	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

77°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462

9°-12°
.19 433
.19 971
.63 664
.98 872

13°-16°
.35 209
.36 336
.51 466
.98 060
73°-76°

13°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.35 209	.36 336	.63 664	.98 872	60
1	263	394	606	869	59
2	318	452	548	867	58
3	373	509	491	864	57
4	427	566	434	861	56
5	.35 481	.36 624	.63 376	.98 858	55
6	536	681	319	855	54
7	590	738	262	852	53
8	644	795	205	849	52
9	698	852	148	846	51
10	.35 752	.36 909	.63 091	.98 843	50
11	806	966	034	840	49
12	860	37 023	62 977	837	48
13	914	080	920	834	47
14	968	137	863	831	46
15	.36 022	.37 193	.62 807	.98 828	45
16	075	250	750	825	44
17	129	306	694	822	43
18	182	363	637	819	42
19	236	419	581	816	41
20	.36 289	.37 476	.62 524	.98 813	40
21	342	532	468	810	39
22	395	588	412	807	38
23	449	644	356	804	37
24	502	700	300	801	36
25	.36 555	.37 756	.62 244	.98 798	35
26	608	812	188	795	34
27	660	868	132	792	33
28	713	924	076	789	32
29	766	980	020	786	31
30	.36 819	.38 035	.61 965	.98 783	30
31	871	091	909	780	29
32	924	147	853	777	28
33	976	202	798	774	27
34	37 028	257	743	771	26
35	.37 081	.38 313	.61 687	.98 768	25
36	133	368	632	765	24
37	185	423	577	762	23
38	237	479	521	759	22
39	289	534	466	756	21
40	.37 341	.38 589	.61 411	.98 753	20
41	393	644	356	750	19
42	445	699	301	746	18
43	497	754	246	743	17
44	549	808	192	740	16
45	.37 600	.38 863	.61 137	.98 737	15
46	652	918	082	734	14
47	703	972	028	731	13
48	755	39 027	60 973	728	12
49	806	082	918	725	11
50	.37 858	.39 136	.60 864	.98 722	10
51	909	190	810	719	9
52	960	245	755	715	8
53	38 011	299	701	712	7
54	062	353	647	709	6
55	.38 113	.39 407	.60 593	.98 706	5
56	164	461	539	703	4
57	215	515	485	700	3
58	266	569	431	697	2
59	317	623	377	694	1
60	.38 368	.39 677	.60 323	.98 690	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

76°

14°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.38 368	.39 677	.60 323	.98 690	60
1	418	731	269	687	59
2	469	785	215	684	58
3	519	838	162	681	57
4	570	892	108	678	56
5	.38 620	.39 945	.60 055	.98 675	55
6	670	999	001	671	54
7	721	40 052	59 948	668	53
8	771	106	894	665	52
9	821	159	841	662	51
10	.38 871	.40 212	.59 788	.98 659	50
11	921	266	734	656	49
12	971	319	681	652	48
13	39 021	372	628	649	47
14	071	425	575	646	46
15	.39 121	.40 478	.59 522	.98 643	45
16	170	531	469	640	44
17	220	584	416	636	43
18	270	636	364	633	42
19	319	689	311	630	41
20	.39 369	.40 742	.59 258	.98 627	40
21	418	795	205	623	39
22	467	847	153	620	38
23	517	900	100	617	37
24	566	952	048	614	36
25	.39 615	.41 005	.58 995	.98 610	35
26	664	057	943	607	34
27	713	109	891	604	33
28	762	161	839	601	32
29	811	214	786	597	31
30	.39 860	.41 266	.58 734	.98 594	30
31	909	318	682	591	29
32	958	370	630	588	28
33	40 006	422	578	584	27
34	055	474	526	581	26
35	.40 103	.41 526	.58 474	.98 578	25
36	152	578	422	574	24
37	200	629	371	571	23
38	249	681	319	568	22
39	297	733	267	565	21
40	.40 346	.41 784	.58 216	.98 561	20
41	394	836	164	558	19
42	442	887	113	555	18
43	490	939	061	551	17
44	538	990	010	548	16
45	.40 586	.42 041	.57 959	.98 545	15
46	634	093	907	541	14
47	682	144	856	538	13
48	730	195	805	535	12
49	778	246	754	531	11
50	.40 825	.42 297	.57 703	.98 528	10
51	873	348	652	525	9
52	921	399	601	521	8
53	968	450	550	518	7
54	41 016	501	499	515	6
55	.41 063	.42 552	.57 448	.98 511	5
56	111	603	397	508	4
57	158	653	347	505	3
58	205	704	296	501	2
59	252	755	245	498	1
60	.41 300	.42 805	.57 195	.98 494	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

75°

15°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.41 300	.42 805	.57 195	.98 494	60
1	347	856	144	491	59
2	394	906	094	488	58
3	441	957	043	484	57
4	488	43 007	56 993	481	56
5	.41 535	.43 057	.56 943	.98 477	55
6	582	108	892	474	54
7	628	158	842	471	53
8	675	208	792	467	52
9	722	258	742	464	51
10	.41 768	.43 308	.56 692	.98 460	50
11	815	358	642	457	49
12	861	408	592	453	48
13	908	458	542	450	47
14	954	508	492	447	46
15	.42 001	.43 558	.56 442	.98 443	45
16	047	607	393	440	44
17	093	657	343	436	43
18	140	707	293	433	42
19	186	756	244	429	41
20	.42 232	.43 806	.56 194	.98 426	40
21	278	855	145	422	39
22	324	905	095	419	38
23	370	954	046	415	37
24	416	44 004	55 996	412	36
25	.42 461	.44 053	.55 947	.98 409	35
26	507	102	898	405	34
27	553	151	849	402	33
28	599	201	799	398	32
29	644	250	750	395	31
30	.42 690	.44 299	.55 701	.98 391	30
31	735	348	652	388	29
32	781	397	603	384	28
33	826	446	554	381	27
34	872	495	505	377	26
35	.42 917	.44 544	.55 456	.98 373	25
36	962	592	408	370	24
37	43 008	641	359	366	23
38	053	690	310	363	22
39	098	738	262	359	21
40	.43 143	.44 787	.55 213	.98 356	20
41	188	836	164	352	19
42	233	884	116	349	18
43	278	933	067	345	17
44	323	981	019	342	16
45	.43 367	.45 029	.54 971	.98 338	15
46	412	078	922	334	14
47	457	126	874	331	13
48	502	174	826	327	12
49	546	222	778	324	11
50	.43 591	.45 271	.54 729	.98 320	10
51	635	319	681	317	9
52	680	367	633	313	8
53	724	415	585	309	7
54	769	463	537	306	6
55	.43 813	.45 511	.54 489	.98 302	5
56	857	559	441	299	4
57	901	606	394	295	3
58	946	654	346	291	2
59	990	702	298	288	1
60	.44 034	.45 750	.54 250	.98 284	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

74°

16°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.44 034	.45 750	.54 250	.98 284	60
1	078	797	203	281	59
2	122	845	155	277	58
3	166	892	108	273	57
4	210	940	060	270	56
5	.44 253	.45 987	.54 013	.98 266	55
6	297	46 035	53 965	262	54
7	341	082	918	259	53
8	385	130	870	255	52
9	428	177	823	251	51
10	.44 472	.46 224	.53 776	.98 248	50
11	516	271	729	244	49
12	559	319	681	240	48
13	602	366	634	237	47
14	646	413	587	233	46
15	.44 689	.46 460	.53 540	.98 229	45
16	733	507	493	226	44
17	776	554	446	222	43
18	819	601	399	218	42
19	862	648	352	215	41
20	.44 905	.46 694	.53 306	.98 211	40
21	948	741	259	207	39
22	992	788	212	204	38
23	45 035	835	165	200	37
24	077	881	119	196	36
25	.45 120	.46 928	.53 072	.98 192	35
26	163	975	025	189	34
27	206	47 021	52 979	185	33
28	249	068	932	181	32
29	292	114	886	177	31
30	.45 334	.47 160	.52 840	.98 174	30
31	377	207	793	170	29
32	419	253	747	166	28
33	462	299	701	162	27
34	504	346	654	159	26
35	.45 547	.47 392	.52 608	.98 155	25
36	589	438	562	151	24
37	632	484	516	147	23
38	674	530	470	144	22
39	716	576	424	140	21
40	.45 758	.47 622	.52 378	.98 136	20
41	801	668	332	132	19
42	843	714	286	129	18
43	885	760	240	125	17
44	927	806	194	121	16
45	.45 969	.47 852	.52 148	.98 117	15
46	46 011	897	103	113	14
47	053	943	057	110	13
48	095	989	011	106	12
49	136	48 035	51 965	102	11
50	.46 178	.48 080	.51 920	.98 098	10
51	220	126	874	094	9
52	262	171	829	090	8
53	303	217	783	087	7
54	345	262	738	083	6
55	.46 386	.48 307	.51 693	.98 079	5
56	428	353	647	075	4
57	469	398	602	071	3
58	511	443	557	067	2
59	552	489	511	063	1
60	.46 594	.48 534	.51 466	.98 060	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

73°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462

9°-12°
.19 433
.19 971
.63 664
.98 872

13°-16°
.35 209
.36 336
.51 466
.98 060

17°-20°
.46 594
.48 534
.41 582
.97 015
69°-72°

17°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.46 594	.48 534	.51 466	.98 060	60
1	635	579	421	056	59
2	676	624	376	052	58
3	717	669	331	048	57
4	758	714	286	044	56
5	.46 800	.48 759	.51 241	.98 040	55
6	841	804	196	036	54
7	882	849	151	032	53
8	923	894	106	029	52
9	964	939	061	025	51
10	.47 005	.48 984	.51 016	.98 021	50
11	045	49 029	50 971	017	49
12	086	073	927	013	48
13	127	118	882	009	47
14	168	163	837	005	46
15	.47 209	.49 207	.50 793	.98 001	45
16	249	252	748	97 997	44
17	290	296	704	993	43
18	330	341	659	989	42
19	371	385	615	986	41
20	.47 411	.49 430	.50 570	.97 982	40
21	452	474	526	978	39
22	492	519	481	974	38
23	533	563	437	970	37
24	573	607	393	966	36
25	.47 613	.49 652	.50 348	.97 962	35
26	654	696	304	958	34
27	694	740	260	954	33
28	734	784	216	950	32
29	774	828	172	946	31
30	.47 814	.49 872	.50 128	.97 942	30
31	854	916	084	938	29
32	894	960	040	934	28
33	934	50 004	49 996	930	27
34	974	048	952	926	26
35	.48 014	.50 092	.49 908	.97 922	25
36	054	136	864	918	24
37	094	180	820	914	23
38	133	223	777	910	22
39	173	267	733	906	21
40	.48 213	.50 311	.49 689	.97 902	20
41	252	355	645	898	19
42	292	398	602	894	18
43	332	442	558	890	17
44	371	485	515	886	16
45	.48 411	.50 529	.49 471	.97 882	15
46	450	572	428	878	14
47	490	616	384	874	13
48	529	659	341	870	12
49	568	703	297	866	11
50	.48 607	.50 746	.49 254	.97 861	10
51	647	789	211	857	9
52	686	833	167	853	8
53	725	876	124	849	7
54	764	919	081	845	6
55	.48 803	.50 962	.49 038	.97 841	5
56	842	51 005	48 995	837	4
57	881	048	952	833	3
58	920	092	908	829	2
59	959	135	865	825	1
60	.48 998	.51 178	.48 822	.97 821	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

72°

18°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.48 998	.51 178	.48 822	.97 821	60
1	49 037	221	779	817	59
2	076	264	736	812	58
3	115	306	694	808	57
4	153	349	651	804	56
5	.49 192	.51 392	.48 608	.97 800	55
6	231	435	565	796	54
7	269	478	522	792	53
8	308	520	480	788	52
9	347	563	437	784	51
10	.49 385	.51 606	.48 394	.97 779	50
11	424	648	352	775	49
12	462	691	309	771	48
13	500	734	266	767	47
14	539	776	224	763	46
15	.49 577	.51 819	.48 181	.97 759	45
16	615	861	139	754	44
17	654	903	097	750	43
18	692	946	054	746	42
19	730	988	012	742	41
20	.49 768	.52 031	.47 969	.97 738	40
21	806	073	927	734	39
22	844	115	885	729	38
23	882	157	843	725	37
24	920	200	800	721	36
25	.49 958	.52 242	.47 758	.97 717	35
26	996	284	716	713	34
27	50 034	326	674	708	33
28	072	368	632	704	32
29	110	410	590	700	31
30	.50 148	.52 452	.47 548	.97 696	30
31	185	494	506	691	29
32	223	536	464	687	28
33	261	578	422	683	27
34	298	620	380	679	26
35	.50 336	.52 661	.47 339	.97 674	25
36	374	703	297	670	24
37	411	745	255	666	23
38	449	787	213	662	22
39	486	829	171	657	21
40	.50 523	.52 870	.47 130	.97 653	20
41	561	912	088	649	19
42	598	953	047	645	18
43	635	995	005	640	17
44	673	53 037	46 963	636	16
45	.50 710	.53 078	.46 922	.97 632	15
46	747	120	880	628	14
47	784	161	839	623	13
48	821	202	798	619	12
49	858	244	756	615	11
50	.50 896	.53 285	.46 715	.97 610	10
51	933	327	673	606	9
52	970	368	632	602	8
53	51 007	409	591	597	7
54	043	450	550	593	6
55	.51 080	.53 492	.46 508	.97 589	5
56	117	533	467	584	4
57	154	574	426	580	3
58	191	615	385	576	2
59	227	656	344	571	1
60	.51 264	.53 697	.46 303	.97 567	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

71°

19°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.51 264	.53 697	.46 303	.97 567	60
1	301	738	262	563	59
2	338	779	221	558	58
3	374	820	180	554	57
4	411	861	139	550	56
5	.51 447	.53 902	.46 098	.97 545	55
6	484	943	057	541	54
7	520	984	016	536	53
8	557	54 025	45 975	532	52
9	593	065	935	528	51
10	.51 629	.54 106	.45 894	.97 523	50
11	666	147	853	519	49
12	702	187	813	515	48
13	738	228	772	510	47
14	774	269	731	506	46
15	.51 811	.54 309	.45 691	.97 501	45
16	847	350	650	497	44
17	883	390	610	492	43
18	919	431	569	488	42
19	955	471	529	484	41
20	.51 991	.54 512	.45 488	.97 479	40
21	52 027	552	448	475	39
22	063	593	407	470	38
23	099	633	367	466	37
24	135	673	327	461	36
25	.52 171	.54 714	.45 286	.97 457	35
26	207	754	246	453	34
27	242	794	206	448	33
28	278	835	165	444	32
29	314	875	125	439	31
30	.52 350	.54 915	.45 085	.97 435	30
31	385	955	045	430	29
32	421	995	005	426	28
33	456	55 035	44 965	421	27
34	492	075	925	417	26
35	.52 527	.55 115	.44 885	.97 412	25
36	563	155	845	408	24
37	598	195	805	403	23
38	634	235	765	399	22
39	669	275	725	394	21
40	.52 705	.55 315	.44 685	.97 390	20
41	740	355	645	385	19
42	775	395	605	381	18
43	811	434	566	376	17
44	846	474	526	372	16
45	.52 881	.55 514	.44 486	.97 367	15
46	916	554	446	363	14
47	951	593	407	358	13
48	986	633	367	353	12
49	53 021	673	327	349	11
50	.53 056	.55 712	.44 288	.97 344	10
51	092	752	248	340	9
52	126	791	209	335	8
53	161	831	169	331	7
54	196	870	130	326	6
55	.53 231	.55 910	.44 090	.97 322	5
56	266	949	051	317	4
57	301	989	011	312	3
58	336	56 028	43 972	308	2
59	370	067	933	303	1
60	.53 405	.56 107	.43 893	.97 299	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

70°

20°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.53 405	.56 107	.43 893	.97 299	60
1	440	146	854	294	59
2	475	185	815	289	58
3	509	224	776	285	57
4	544	264	736	280	56
5	.53 578	.56 303	.43 697	.97 276	55
6	613	342	658	271	54
7	647	381	619	266	53
8	682	420	580	262	52
9	716	459	541	257	51
10	.53 751	.56 498	.43 502	.97 252	50
11	785	537	463	248	49
12	819	576	424	243	48
13	854	615	385	238	47
14	888	654	346	234	46
15	.53 922	.56 693	.43 307	.97 229	45
16	957	732	268	224	44
17	991	771	229	220	43
18	54 025	810	190	215	42
19	059	849	151	210	41
20	.54 093	.56 887	.43 113	.97 206	40
21	127	926	074	201	39
22	161	965	035	196	38
23	195	57 004	42 996	192	37
24	229	042	958	187	36
25	.54 263	.57 081	.42 919	.97 182	35
26	297	120	880	178	34
27	331	158	842	173	33
28	365	197	803	168	32
29	399	235	765	163	31
30	.54 433	.57 274	.42 726	.97 159	30
31	466	312	688	154	29
32	500	351	649	149	28
33	534	389	611	145	27
34	567	428	572	140	26
35	.54 601	.57 466	.42 534	.97 135	25
36	635	504	496	130	24
37	668	543	457	126	23
38	702	581	419	121	22
39	735	619	381	116	21
40	.54 769	.57 658	.42 342	.97 111	20
41	802	696	304	107	19
42	836	734	266	102	18
43	869	772	228	097	17
44	903	810	190	092	16
45	.54 936	.57 849	.42 151	.97 087	15
46	969	887	113	083	14
47	55 003	925	075	078	13
48	036	963	037	073	12
49	069	58 001	41 999	068	11
50	.55 102	.58 039	.41 961	.97 063	10
51	136	077	923	059	9
52	169	115	885	054	8
53	202	153	847	049	7
54	235	191	809	044	6
55	.55 268	.58 229	.41 771	.97 039	5
56	301	267	733	035	4
57	334	304	696	030	3
58	367	342	658	025	2
59	400	380	620	020	1
60	.55 433	.58 418	.41 582	.97 015	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

69°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462

9°-12°
.19 433
.19 971
.63 664
.98 872

13°-16°
.35 209
.36 336
.51 466
.98 060

17°-20°
.46 594
.48 534
.41 582
.97 015

21°-24°
.55 433
.58 418
.33 133
.95 728
65°-68°

21°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.55 433	.58 418	.41 582	.97 015	60
1	466	455	545	010	59
2	499	493	507	005	58
3	532	531	469	001	57
4	564	569	431	96 996	56
5	.55 597	.58 606	.41 394	.96 991	55
6	630	644	356	986	54
7	663	681	319	981	53
8	695	719	281	976	52
9	728	757	243	971	51
10	.55 761	.58 794	.41 206	.96 966	50
11	793	832	168	962	49
12	826	869	131	957	48
13	858	907	093	952	47
14	891	944	056	947	46
15	.55 923	.58 981	.41 019	.96 942	45
16	956	59 019	40 981	937	44
17	988	056	944	932	43
18	56 021	094	906	927	42
19	053	131	869	922	41
20	.56 085	.59 168	.40 832	.96 917	40
21	118	205	795	912	39
22	150	243	757	907	38
23	182	280	720	903	37
24	215	317	683	898	36
25	.56 247	.59 354	.40 646	.96 893	35
26	279	391	609	888	34
27	311	429	571	883	33
28	343	466	534	878	32
29	375	503	497	873	31
30	.56 408	.59 540	.40 460	.96 868	30
31	440	577	423	863	29
32	472	614	386	858	28
33	504	651	349	853	27
34	536	688	312	848	26
35	.56 568	.59 725	.40 275	.96 843	25
36	599	762	238	838	24
37	631	799	201	833	23
38	663	835	165	828	22
39	695	872	128	823	21
40	.56 727	.59 909	.40 091	.96 818	20
41	759	946	054	813	19
42	790	983	017	808	18
43	822	60 019	39 981	803	17
44	854	056	944	798	16
45	.56 886	.60 093	.39 907	.96 793	15
46	917	130	870	788	14
47	949	166	834	783	13
48	980	203	797	778	12
49	57 012	240	760	772	11
50	.57 044	.60 276	.39 724	.96 767	10
51	075	313	687	762	9
52	107	349	651	757	8
53	138	386	614	752	7
54	169	422	578	747	6
55	.57 201	.60 459	.39 541	.96 742	5
56	232	495	505	737	4
57	264	532	468	732	3
58	295	568	432	727	2
59	326	605	395	722	1
60	.57 358	.60 641	.39 359	.96 717	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

68°

22°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.57 358	.60 641	.39 359	.96 717	60
1	389	677	323	711	59
2	420	714	286	706	58
3	451	750	250	701	57
4	482	786	214	696	56
5	.57 514	.60 823	.39 177	.96 691	55
6	545	859	141	686	54
7	576	895	105	681	53
8	607	931	069	676	52
9	638	967	033	670	51
10	.57 669	.61 004	.38 996	.96 665	50
11	700	040	960	660	49
12	731	076	924	655	48
13	762	112	888	650	47
14	793	148	852	645	46
15	.57 824	.61 184	.38 816	.96 640	45
16	855	220	780	634	44
17	885	256	744	629	43
18	916	292	708	624	42
19	947	328	672	619	41
20	.57 978	.61 364	.38 636	.96 614	40
21	58 008	400	600	608	39
22	039	436	564	603	38
23	070	472	528	598	37
24	101	508	492	593	36
25	.58 131	.61 544	.38 456	.96 588	35
26	162	579	421	582	34
27	192	615	385	577	33
28	223	651	349	572	32
29	253	687	313	567	31
30	.58 284	.61 722	.38 278	.96 562	30
31	314	758	242	556	29
32	345	794	206	551	28
33	375	830	170	546	27
34	406	865	135	541	26
35	.58 436	.61 901	.38 099	.96 535	25
36	467	936	064	530	24
37	497	972	028	525	23
38	527	62 008	37 992	520	22
39	557	043	957	514	21
40	.58 588	.62 079	.37 921	.96 509	20
41	618	114	886	504	19
42	648	150	850	498	18
43	678	185	815	493	17
44	709	221	779	488	16
45	.58 739	.62 256	.37 744	.96 483	15
46	769	292	708	477	14
47	799	327	673	472	13
48	829	362	638	467	12
49	859	398	602	461	11
50	.58 889	.62 433	.37 567	.96 456	10
51	919	468	532	451	9
52	949	504	496	445	8
53	979	539	461	440	7
54	59 009	574	426	435	6
55	.59 039	.62 609	.37 391	.96 429	5
56	069	645	355	424	4
57	098	680	320	419	3
58	128	715	285	413	2
59	158	750	250	408	1
60	.59 188	.62 785	.37 215	.96 403	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

67°

23°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.59 188	.62 785	.37 215	.96 403	60
1	218	820	180	397	59
2	247	855	145	392	58
3	277	890	110	387	57
4	307	926	074	381	56
5	.59 336	.62 961	.37 039	.96 376	55
6	366	996	004	370	54
7	396	63 031	36 969	365	53
8	425	066	934	360	52
9	455	101	899	354	51
10	.59 484	.63 135	.36 865	.96 349	50
11	514	170	830	343	49
12	543	205	795	338	48
13	573	240	760	333	47
14	602	275	725	327	46
15	.59 632	.63 310	.36 690	.96 322	45
16	661	345	655	316	44
17	690	379	621	311	43
18	720	414	586	305	42
19	749	449	551	300	41
20	.59 778	.63 484	.36 516	.96 294	40
21	808	519	481	289	39
22	837	553	447	284	38
23	866	588	412	278	37
24	895	623	377	273	36
25	.59 924	.63 657	.36 343	.96 267	35
26	954	692	308	262	34
27	983	726	274	256	33
28	60 012	761	239	251	32
29	041	796	204	245	31
30	.60 070	.63 830	.36 170	.96 240	30
31	099	865	135	234	29
32	128	899	101	229	28
33	157	934	066	223	27
34	186	968	032	218	26
35	.60 215	.64 003	.35 997	.96 212	25
36	244	037	963	207	24
37	273	072	928	201	23
38	302	106	894	196	22
39	331	140	860	190	21
40	.60 359	.64 175	.35 825	.96 185	20
41	388	209	791	179	19
42	417	243	757	174	18
43	446	278	722	168	17
44	474	312	688	162	16
45	.60 503	.64 346	.35 654	.96 157	15
46	532	381	619	151	14
47	561	415	585	146	13
48	589	449	551	140	12
49	618	483	517	135	11
50	.60 646	.64 517	.35 483	.96 129	10
51	675	552	448	123	9
52	704	586	414	118	8
53	732	620	380	112	7
54	761	654	346	107	6
55	.60 789	.64 688	.35 312	.96 101	5
56	818	722	278	095	4
57	846	756	244	090	3
58	875	790	210	084	2
59	903	824	176	079	1
60	.60 931	.64 858	.35 142	.96 073	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

66°

24°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.60 931	.64 858	.35 142	.96 073	60
1	960	892	108	067	59
2	988	926	074	062	58
3	61 016	960	040	056	57
4	045	994	006	050	56
5	.61 073	.65 028	.34 972	.96 045	55
6	101	062	938	039	54
7	129	096	904	034	53
8	158	130	870	028	52
9	186	164	836	022	51
10	.61 214	.65 197	.34 803	.96 017	50
11	242	231	769	011	49
12	270	265	735	005	48
13	298	299	701	000	47
14	326	333	667	95 994	46
15	.61 354	.65 366	.34 634	.95 988	45
16	382	400	600	982	44
17	411	434	566	977	43
18	438	467	533	971	42
19	466	501	499	965	41
20	.61 494	.65 535	.34 465	.95 960	40
21	522	568	432	954	39
22	550	602	398	948	38
23	578	636	364	942	37
24	606	669	331	937	36
25	.61 634	.65 703	.34 297	.95 931	35
26	662	736	264	925	34
27	689	770	230	920	33
28	717	803	197	914	32
29	745	837	163	908	31
30	.61 773	.65 870	.34 130	.95 902	30
31	800	904	096	897	29
32	828	937	063	891	28
33	856	971	029	885	27
34	883	66 004	33 996	879	26
35	.61 911	.66 038	.33 962	.95 873	25
36	939	071	929	868	24
37	966	104	896	862	23
38	994	138	862	856	22
39	62 021	171	829	850	21
40	.62 049	.66 204	.33 796	.95 844	20
41	076	238	762	839	19
42	104	271	729	833	18
43	131	304	696	827	17
44	159	337	663	821	16
45	.62 186	.66 371	.33 629	.95 815	15
46	214	404	596	810	14
47	241	437	563	804	13
48	268	470	530	798	12
49	296	503	497	792	11
50	.62 323	.66 537	.33 463	.95 786	10
51	350	570	430	780	9
52	377	603	397	775	8
53	405	636	364	769	7
54	432	669	331	763	6
55	.62 459	.66 702	.33 298	.95 757	5
56	486	735	265	751	4
57	513	768	232	745	3
58	541	801	199	739	2
59	568	834	166	733	1
60	.62 595	.66 867	.33 133	.95 728	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

65°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462
84°-81°

9°-12°
.19 433
.19 971
.63 664
.98 872
77°-80°

13°-16°
.35 209
.36 336
.51 466
.98 060
73°-76°

17°-20°
.46 594
.48 534
.41 582
.97 015

21°-24°
.55 433
.58 418
.33 133
.95 728
65°-68°

25°-28°
.62 595
.66 867
.25 625
.94 182
61°-64°

25°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.62 595	.66 867	.33 133	.95 728	60
1	622	900	100	722	59
2	649	933	067	716	58
3	676	966	034	710	57
4	703	999	001	704	56
5	.62 730	.67 032	.32 968	.95 698	55
6	757	065	935	692	54
7	784	098	902	686	53
8	811	131	869	680	52
9	838	163	837	674	51
10	.62 865	.67 196	.32 804	.95 668	50
11	892	229	771	663	49
12	918	262	738	657	48
13	945	295	705	651	47
14	972	327	673	645	46
15	.62 999	.67 360	.32 640	.95 639	45
16	63 026	393	607	633	44
17	052	426	574	627	43
18	079	458	542	621	42
19	106	491	509	615	41
20	.63 133	.67 524	.32 476	.95 609	40
21	159	556	444	603	39
22	186	589	411	597	38
23	213	622	378	591	37
24	239	654	346	585	36
25	.63 266	.67 687	.32 313	.95 579	35
26	292	719	281	573	34
27	319	752	248	567	33
28	345	785	215	561	32
29	372	817	183	555	31
30	.63 398	.67 850	.32 150	.95 549	30
31	425	882	118	543	29
32	451	915	085	537	28
33	478	947	053	531	27
34	504	980	020	525	26
35	.63 531	.68 012	.31 988	.95 519	25
36	557	044	956	513	24
37	583	077	923	507	23
38	610	109	891	500	22
39	636	142	858	494	21
40	.63 662	.68 174	.31 826	.95 488	20
41	689	206	794	482	19
42	715	239	761	476	18
43	741	271	729	470	17
44	767	303	697	464	16
45	.63 794	.68 336	.31 664	.95 458	15
46	820	368	632	452	14
47	846	400	600	446	13
48	872	432	568	440	12
49	898	465	535	434	11
50	.63 924	.68 497	.31 503	.95 427	10
51	950	529	471	421	9
52	976	561	439	415	8
53	64 002	593	407	409	7
54	028	626	374	403	6
55	.64 054	.68 658	.31 342	.95 397	5
56	080	690	310	391	4
57	106	722	278	384	3
58	132	754	246	378	2
59	158	786	214	372	1
60	.64 184	.68 818	.31 182	.95 366	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

64°

26°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.64 184	.68 818	.31 182	.95 366	60
1	210	850	150	360	59
2	236	882	118	354	58
3	262	914	086	348	57
4	288	946	054	341	56
5	.64 313	.68 978	.31 022	.95 335	55
6	339	69 010	30 990	329	54
7	365	042	958	323	53
8	391	074	926	317	52
9	417	106	894	310	51
10	.64 442	.69 138	.30 862	.95 304	50
11	468	170	830	298	49
12	494	202	798	292	48
13	519	234	766	286	47
14	545	266	734	279	46
15	.64 571	.69 298	.30 702	.95 273	45
16	596	329	671	267	44
17	622	361	639	261	43
18	647	393	607	254	42
19	673	425	575	248	41
20	.64 698	.69 457	.30 543	.95 242	40
21	724	488	512	236	39
22	749	520	480	229	38
23	775	552	448	223	37
24	800	584	416	217	36
25	.64 826	.69 615	.30 385	.95 211	35
26	851	647	353	204	34
27	877	679	321	198	33
28	902	710	290	192	32
29	927	742	258	185	31
30	.64 953	.69 774	.30 226	.95 179	30
31	978	805	195	173	29
32	65 003	837	163	167	28
33	029	868	132	160	27
34	054	900	100	154	26
35	.65 079	.69 932	.30 068	.95 148	25
36	104	963	037	141	24
37	130	995	005	135	23
38	155	70 026	29 974	129	22
39	180	058	942	122	21
40	.65 205	.70 089	.29 911	.95 116	20
41	230	121	879	110	19
42	255	152	848	103	18
43	281	184	816	097	17
44	306	215	785	090	16
45	.65 331	.70 247	.29 753	.95 084	15
46	356	278	722	078	14
47	381	309	691	071	13
48	406	341	659	065	12
49	431	372	628	059	11
50	.65 456	.70 404	.29 596	.95 052	10
51	481	435	565	046	9
52	506	466	534	039	8
53	531	498	502	033	7
54	556	529	471	027	6
55	.65 580	.70 560	.29 440	.95 020	5
56	605	592	408	014	4
57	630	623	377	007	3
58	655	654	346	001	2
59	680	685	315	94 995	1
60	.65 705	.70 717	.29 283	.94 988	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

63°

27°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.65 705	.70 717	.29 283	.94 988	60
1	729	748	252	982	59
2	754	779	221	975	58
3	779	810	190	969	57
4	804	841	159	962	56
5	.65 828	.70 873	.29 127	.94 956	55
6	853	904	096	949	54
7	878	935	065	943	53
8	902	966	034	936	52
9	927	997	003	930	51
10	.65 952	.71 028	.28 972	.94 923	50
11	976	059	941	917	49
12	66 001	090	910	911	48
13	025	121	879	904	47
14	050	153	847	898	46
15	.66 075	.71 184	.28 816	.94 891	45
16	099	215	785	885	44
17	124	246	754	878	43
18	148	277	723	871	42
19	173	308	692	865	41
20	.66 197	.71 339	.28 661	.94 858	40
21	221	370	630	852	39
22	246	401	599	845	38
23	270	431	569	839	37
24	295	462	538	832	36
25	.66 319	.71 493	.28 507	.94 826	35
26	343	524	476	819	34
27	368	555	445	813	33
28	392	586	414	806	32
29	416	617	383	799	31
30	.66 441	.71 648	.28 352	.94 793	30
31	465	679	321	786	29
32	489	709	291	780	28
33	513	740	260	773	27
34	537	771	229	767	26
35	.66 562	.71 802	.28 198	.94 760	25
36	586	833	167	753	24
37	610	863	137	747	23
38	634	894	106	740	22
39	658	925	075	734	21
40	.66 682	.71 955	.28 045	.94 727	20
41	706	986	014	720	19
42	731	72 017	27 983	714	18
43	755	048	952	707	17
44	779	078	922	700	16
45	.66 803	.72 109	.27 891	.94 694	15
46	827	140	860	687	14
47	851	170	830	680	13
48	875	201	799	674	12
49	899	231	769	667	11
50	.66 922	.72 262	.27 738	.94 660	10
51	946	293	707	654	9
52	970	323	677	647	8
53	994	354	646	640	7
54	67 018	384	616	634	6
55	.67 042	.72 415	.27 585	.94 627	5
56	066	445	555	620	4
57	090	476	524	614	3
58	113	506	494	607	2
59	137	537	463	600	1
60	.67 161	.72 567	.27 433	.94 593	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

62°

28°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.67 161	.72 567	.27 433	.94 593	60
1	185	598	402	587	59
2	208	628	372	580	58
3	232	659	341	573	57
4	256	689	311	567	56
5	.67 280	.72 720	.27 280	.94 560	55
6	303	750	250	553	54
7	327	780	220	546	53
8	350	811	189	540	52
9	374	841	159	533	51
10	.67 398	.72 872	.27 128	.94 526	50
11	421	902	098	519	49
12	445	932	068	513	48
13	468	963	037	506	47
14	492	993	007	499	46
15	.67 515	.73 023	.26 977	.94 492	45
16	539	054	946	485	44
17	562	084	916	479	43
18	586	114	886	472	42
19	609	144	856	465	41
20	.67 633	.73 175	.26 825	.94 458	40
21	656	205	795	451	39
22	680	235	765	445	38
23	703	265	735	438	37
24	726	295	705	431	36
25	.67 750	.73 326	.26 674	.94 424	35
26	773	356	644	417	34
27	796	386	614	410	33
28	820	416	584	404	32
29	843	446	554	397	31
30	.67 866	.73 476	.26 524	.94 390	30
31	890	507	493	383	29
32	913	537	463	376	28
33	936	567	433	369	27
34	959	597	403	362	26
35	.67 982	.73 627	.26 373	.94 355	25
36	68 006	657	343	349	24
37	029	687	313	342	23
38	052	717	283	335	22
39	075	747	253	328	21
40	.68 098	.73 777	.26 223	.94 321	20
41	121	807	193	314	19
42	144	837	163	307	18
43	167	867	133	300	17
44	190	897	103	293	16
45	.68 213	.73 927	.26 073	.94 286	15
46	237	957	043	279	14
47	260	987	013	273	13
48	283	74 017	25 983	266	12
49	305	047	953	259	11
50	.68 328	.74 077	.25 923	.94 252	10
51	351	107	893	245	9
52	374	137	863	238	8
53	397	166	834	231	7
54	420	196	804	224	6
55	.68 443	.74 226	.25 774	.94 217	5
56	466	256	744	210	4
57	489	286	714	203	3
58	512	316	684	196	2
59	534	345	655	189	1
60	.68 557	.74 375	.25 625	.94 182	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

61°

1°-4°
2.2418
2.2419
1.0580
.99 834

85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462

9°-12°
.19 433
.19 971
.63 664
.98 872

77°-80°

13°-16°
.35 209
.36 336
.51 466
.98 060

73°-76°

17°-20°
.46 594
.48 534
.41 582
.97 015

21°-24°
.55 433
.58 418
.33 133
.95 728

65°-68°

25°-28°
.62 595
.66 867
.25 625
.94 182

61°-64°

29°-32°
.68 557
.74 375
.18 748
.92 359

57°-60°

29°

′	log sin	log tan	log cot	log cos	′
	9-10	9-10	0	9-10	
0	.68 557	.74 375	.25 625	.94 182	60
1	580	405	595	175	59
2	603	435	565	168	58
3	625	465	535	161	57
4	648	494	506	154	56
5	.68 671	.74 524	.25 476	.94 147	55
6	694	554	446	140	54
7	716	583	417	133	53
8	739	613	387	126	52
9	762	643	357	119	51
10	.68 784	.74 673	.25 327	.94 112	50
11	807	702	298	105	49
12	829	732	268	098	48
13	852	762	238	090	47
14	875	791	209	083	46
15	.68 897	.74 821	.25 179	.94 076	45
16	920	851	149	069	44
17	942	880	120	062	43
18	965	910	090	055	42
19	987	939	061	048	41
20	.69 010	.74 969	.25 031	.94 041	40
21	032	998	002	034	39
22	055	75 028	24 972	027	38
23	077	058	942	020	37
24	100	087	913	012	36
25	.69 122	.75 117	.24 883	.94 005	35
26	144	146	854	93 998	34
27	167	176	824	991	33
28	189	205	795	984	32
29	212	235	765	977	31
30	.69 234	.75 264	.24 736	.93 970	30
31	256	294	706	963	29
32	279	323	677	955	28
33	301	353	647	948	27
34	323	382	618	941	26
35	.69 345	.75 411	.24 589	.93 934	25
36	368	441	559	927	24
37	390	470	530	920	23
38	412	500	500	912	22
39	434	529	471	905	21
40	.69 456	.75 558	.24 442	.93 898	20
41	479	588	412	891	19
42	501	617	383	884	18
43	523	647	353	876	17
44	545	676	324	869	16
45	.69 567	.75 705	.24 295	.93 862	15
46	589	735	265	855	14
47	611	764	236	847	13
48	633	793	207	840	12
49	655	822	178	833	11
50	.69 677	.75 852	.24 148	.93 826	10
51	699	881	119	819	9
52	721	910	090	811	8
53	743	939	061	804	7
54	765	969	031	797	6
55	.69 787	.75 998	.24 002	.93 789	5
56	809	76 027	23 973	782	4
57	831	056	944	775	3
58	853	086	914	768	2
59	875	115	885	760	1
60	.69 897	.76 144	.23 856	.93 753	0
	9-10	9-10	0	9-10	
′	log cos	log cot	log tan	log sin	′

60°

30°

′	log sin	log tan	log cot	log cos	′
	9-10	9-10	0	9-10	
0	.69 897	.76 144	.23 856	.93 753	60
1	919	173	827	746	59
2	941	202	798	738	58
3	963	231	769	731	57
4	984	261	739	724	56
5	.70 006	.76 290	.23 710	.93 717	55
6	028	319	681	709	54
7	050	348	652	702	53
8	072	377	623	695	52
9	093	406	594	687	51
10	.70 115	.76 435	.23 565	.93 680	50
11	137	464	536	673	49
12	159	493	507	665	48
13	180	522	478	658	47
14	202	551	449	650	46
15	.70 224	.76 580	.23 420	.93 643	45
16	245	609	391	636	44
17	267	639	361	628	43
18	288	668	332	621	42
19	310	697	303	614	41
20	.70 332	.76 725	.23 275	.93 606	40
21	353	754	246	599	39
22	375	783	217	591	38
23	396	812	188	584	37
24	418	841	159	577	36
25	.70 439	.76 870	.23 130	.93 569	35
26	461	899	101	562	34
27	482	928	072	554	33
28	504	957	043	547	32
29	525	986	014	539	31
30	.70 547	.77 015	.22 985	.93 532	30
31	568	044	956	525	29
32	590	073	927	517	28
33	611	101	899	510	27
34	633	130	870	502	26
35	.70 654	.77 159	.22 841	.93 495	25
36	675	188	812	487	24
37	697	217	783	480	23
38	718	246	754	472	22
39	739	274	726	465	21
40	.70 761	.77 303	.22 697	.93 457	20
41	782	332	668	450	19
42	803	361	639	442	18
43	824	390	610	435	17
44	846	418	582	427	16
45	.70 867	.77 447	.22 553	.93 420	15
46	888	476	524	412	14
47	909	505	495	405	13
48	931	533	467	397	12
49	952	562	438	390	11
50	.70 973	.77 591	.22 409	.93 382	10
51	994	619	381	375	9
52	71 015	648	352	367	8
53	036	677	323	360	7
54	058	706	294	352	6
55	.71 079	.77 734	.22 266	.93 344	5
56	100	763	237	337	4
57	121	791	209	329	3
58	142	820	180	322	2
59	163	849	151	314	1
60	.71 184	.77 877	.22 123	.93 307	0
	9-10	9-10	0	9-10	
′	log cos	log cot	log tan	log sin	′

59°

31°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.71 184	.77 877	.22 123	.93 307	60
1	205	906	094	299	59
2	226	935	065	291	58
3	247	963	037	284	57
4	268	992	008	276	56
5	.71 289	.78 020	.21 980	.93 269	55
6	310	049	951	261	54
7	331	077	923	253	53
8	352	106	894	246	52
9	373	135	865	238	51
10	.71 393	.78 163	.21 837	.93 230	50
11	414	192	808	223	49
12	435	220	780	215	48
13	456	249	751	207	47
14	477	277	723	200	46
15	.71 498	.78 306	.21 694	.93 192	45
16	519	334	666	184	44
17	539	363	637	177	43
18	560	391	609	169	42
19	581	419	581	161	41
20	.71 602	.78 448	.21 552	.93 154	40
21	622	476	524	146	39
22	643	505	495	138	38
23	664	533	467	131	37
24	685	562	438	123	36
25	.71 705	.78 590	.21 410	.93 115	35
26	726	618	382	108	34
27	747	647	353	100	33
28	767	675	325	092	32
29	788	704	296	084	31
30	.71 809	.78 732	.21 268	.93 077	30
31	829	760	240	069	29
32	850	789	211	061	28
33	870	817	183	053	27
34	891	845	155	046	26
35	.71 911	.78 874	.21 126	.93 038	25
36	932	902	098	030	24
37	952	930	070	022	23
38	973	959	041	014	22
39	994	987	013	007	21
40	.72 014	.79 015	.20 985	.92 999	20
41	034	043	957	991	19
42	055	072	928	983	18
43	075	100	900	976	17
44	096	128	872	968	16
45	.72 116	.79 156	.20 844	.92 960	15
46	137	185	815	952	14
47	157	213	787	944	13
48	177	241	759	936	12
49	198	269	731	929	11
50	.72 218	.79 297	.20 703	.92 921	10
51	238	326	674	913	9
52	259	354	646	905	8
53	279	382	618	897	7
54	299	410	590	889	6
55	.72 320	.79 438	.20 562	.92 881	5
56	340	466	534	874	4
57	360	495	505	866	3
58	381	523	477	858	2
59	401	551	449	850	1
60	.72 421	.79 579	.20 421	.92 842	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

58°

32°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.72 421	.79 579	.20 421	.92 842	60
1	441	607	393	834	59
2	461	635	365	826	58
3	482	663	337	818	57
4	502	691	309	810	56
5	.72 522	.79 719	.20 281	.92 803	55
6	542	747	253	795	54
7	562	776	224	787	53
8	582	804	196	779	52
9	602	832	168	771	51
10	.72 622	.79 860	.20 140	.92 763	50
11	643	888	112	755	49
12	663	916	084	747	48
13	683	944	056	739	47
14	703	972	028	731	46
15	.72 723	.80 000	.20 000	.92 723	45
16	743	028	19 972	715	44
17	763	056	944	707	43
18	783	084	916	699	42
19	803	112	888	691	41
20	.72 823	.80 140	.19 860	.92 683	40
21	843	168	832	675	39
22	863	195	805	667	38
23	883	223	777	659	37
24	902	251	749	651	36
25	.72 922	.80 279	.19 721	.92 643	35
26	942	307	693	635	34
27	962	335	665	627	33
28	982	363	637	619	32
29	73 002	391	609	611	31
30	.73 022	.80 419	.19 581	.92 603	30
31	041	447	553	595	29
32	061	474	526	587	28
33	081	502	498	579	27
34	101	530	470	571	26
35	.73 121	.80 558	.19 442	.92 563	25
36	140	586	414	555	24
37	160	614	386	546	23
38	180	642	358	538	22
39	200	669	331	530	21
40	.73 219	.80 697	.19 303	.92 522	20
41	239	725	275	514	19
42	259	753	247	506	18
43	278	781	219	498	17
44	298	808	192	490	16
45	.73 318	.80 836	.19 164	.92 482	15
46	337	864	136	473	14
47	357	892	108	465	13
48	377	919	081	457	12
49	396	947	053	449	11
50	.73 416	.80 975	.19 025	.92 441	10
51	435	81 003	18 997	433	9
52	455	030	970	425	8
53	474	058	942	416	7
54	494	086	914	408	6
55	.73 513	.81 113	.18 887	.92 400	5
56	533	141	859	392	4
57	552	169	831	384	3
58	572	196	804	376	2
59	591	224	776	367	1
60	.73 611	.81 252	.18 748	.92 359	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

57°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462

9°-12°
.19 433
.19 971
.63 664
.98 872
77°-80°

13°-16°
.35 209
.36 336
.51 466
.98 060
73°-76°

17°-20°
.46 594
.48 534
.41 582
.97 015

21°-24°
.55 433
.58 418
.33 133
.95 728
65°-68°

25°-28°
.62 595
.66 867
.25 625
.94 182
61°-64°

29°-32°
.68 557
.74 375
.18 748
.92 359
57°-60°

33°-36°
.73 611
.81 252
.12 289
.90 235
53°-56°

33°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.73 611	.81 252	.18 748	.92 359	60
1	630	279	721	351	59
2	650	307	693	343	58
3	669	335	665	335	57
4	689	362	638	326	56
5	.73 708	.81 390	.18 610	.92 318	55
6	727	418	582	310	54
7	747	445	555	302	53
8	766	473	527	293	52
9	785	500	500	285	51
10	.73 805	.81 528	.18 472	.92 277	50
11	824	556	444	269	49
12	843	583	417	260	48
13	863	611	389	252	47
14	882	638	362	244	46
15	.73 901	.81 666	.18 334	.92 235	45
16	921	693	307	227	44
17	940	721	279	219	43
18	959	748	252	211	42
19	978	776	224	202	41
20	.73 997	.81 803	.18 197	.92 194	40
21	74 017	831	169	186	39
22	036	858	142	177	38
23	055	886	114	169	37
24	074	913	087	161	36
25	.74 093	.81 941	.18 059	.92 152	35
26	113	968	032	144	34
27	132	996	004	136	33
28	151	82 023	17 977	127	32
29	170	051	949	119	31
30	.74 189	.82 078	.17 922	.92 111	30
31	208	106	894	102	29
32	227	133	867	094	28
33	246	161	839	086	27
34	265	188	812	077	26
35	.74 284	.82 215	.17 785	.92 069	25
36	303	243	757	060	24
37	322	270	730	052	23
38	341	298	702	044	22
39	360	325	675	035	21
40	.74 379	.82 352	.17 648	.92 027	20
41	398	380	620	018	19
42	417	407	593	010	18
43	436	435	565	002	17
44	455	462	538	91 993	16
45	.74 474	.82 489	.17 511	.91 985	15
46	493	517	483	976	14
47	512	544	456	968	13
48	531	571	429	959	12
49	549	599	401	951	11
50	.74 568	.82 626	.17 374	.91 942	10
51	587	653	347	934	9
52	606	681	319	925	8
53	625	708	292	917	7
54	644	735	265	908	6
55	.74 662	.82 762	.17 238	.91 900	5
56	681	790	210	891	4
57	700	817	183	883	3
58	719	844	156	874	2
59	737	871	129	866	1
60	.74 756	.82 899	.17 101	.91 857	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

56°

34°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.74 756	.82 899	.17 101	.91 857	60
1	775	926	074	849	59
2	794	953	047	840	58
3	812	980	020	832	57
4	831	83 008	16 992	823	56
5	.74 850	.83 035	.16 965	.91 815	55
6	868	062	938	806	54
7	887	089	911	798	53
8	906	117	883	789	52
9	924	144	856	781	51
10	.74 943	.83 171	.16 829	.91 772	50
11	961	198	802	763	49
12	980	225	775	755	48
13	999	252	748	746	47
14	75 017	280	720	738	46
15	.75 036	.83 307	.16 693	.91 729	45
16	054	334	666	720	44
17	073	361	639	712	43
18	091	388	612	703	42
19	110	415	585	695	41
20	.75 128	.83 442	.16 558	.91 686	40
21	147	470	530	677	39
22	165	497	503	669	38
23	184	524	476	660	37
24	202	551	449	651	36
25	.75 221	.83 578	.16 422	.91 643	35
26	239	605	395	634	34
27	258	632	368	625	33
28	276	659	341	617	32
29	294	686	314	608	31
30	.75 313	.83 713	.16 287	.91 599	30
31	331	740	260	591	29
32	350	768	232	582	28
33	368	795	205	573	27
34	386	822	178	565	26
35	.75 405	.83 849	.16 151	.91 556	25
36	423	876	124	547	24
37	441	903	097	538	23
38	459	930	070	530	22
39	478	957	043	521	21
40	.75 496	.83 984	.16 016	.91 512	20
41	514	84 011	15 989	504	19
42	533	038	962	495	18
43	551	065	935	486	17
44	569	092	908	477	16
45	.75 587	.84 119	.15 881	.91 469	15
46	605	146	854	460	14
47	624	173	827	451	13
48	642	200	800	442	12
49	660	227	773	433	11
50	.75 678	.84 254	.15 746	.91 425	10
51	696	280	720	416	9
52	714	307	693	407	8
53	733	334	666	398	7
54	751	361	639	389	6
55	.75 769	.84 388	.15 612	.91 381	5
56	787	415	585	372	4
57	805	442	558	363	3
58	823	469	531	354	2
59	841	496	504	345	1
60	.75 859	.84 523	.15 477	.91 336	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

55°

35°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.75 859	.84 523	.15 477	.91 336	60
1	877	550	450	328	59
2	895	576	424	319	58
3	913	603	397	310	57
4	931	630	370	301	56
5	.75 949	.84 657	.15 343	.91 292	55
6	967	684	316	283	54
7	985	711	289	274	53
8	76 003	738	262	266	52
9	021	764	236	257	51
10	.76 039	.84 791	.15 209	.91 248	50
11	057	818	182	239	49
12	075	845	155	230	48
13	093	872	128	221	47
14	111	899	101	212	46
15	.76 129	.84 925	.15 075	.91 203	45
16	146	952	048	194	44
17	164	979	021	185	43
18	182	85 006	14 994	176	42
19	200	033	967	167	41
20	.76 218	.85 059	.14 941	.91 158	40
21	236	086	914	149	39
22	253	113	887	141	38
23	271	140	860	132	37
24	289	166	834	123	36
25	.76 307	.85 193	.14 807	.91 114	35
26	324	220	780	105	34
27	342	247	753	096	33
28	360	273	727	087	32
29	378	300	700	078	31
30	.76 395	.85 327	.14 673	.91 069	30
31	413	354	646	060	29
32	431	380	620	051	28
33	448	407	593	042	27
34	466	434	566	033	26
35	.76 484	.85 460	.14 540	.91 023	25
36	501	487	513	014	24
37	519	514	486	005	23
38	537	540	460	90 996	22
39	554	567	433	987	21
40	.76 572	.85 594	.14 406	.90 978	20
41	590	620	380	969	19
42	607	647	353	960	18
43	625	674	326	951	17
44	642	700	300	942	16
45	.76 660	.85 727	.14 273	.90 933	15
46	677	754	246	924	14
47	695	780	220	915	13
48	712	807	193	906	12
49	730	834	166	896	11
50	.76 747	.85 860	.14 140	.90 887	10
51	765	887	113	878	9
52	782	913	087	869	8
53	800	940	060	860	7
54	817	967	033	851	6
55	.76 835	.85 993	.14 007	.90 842	5
56	852	86 020	13 980	832	4
57	870	046	954	823	3
58	887	073	927	814	2
59	904	100	900	805	1
60	.76 922	.86 126	.13 874	.90 796	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

54°

36°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.76 922	.86 126	.13 874	.90 796	60
1	939	153	847	787	59
2	957	179	821	777	58
3	974	206	794	768	57
4	991	232	768	759	56
5	.77 009	.86 259	.13 741	.90 750	55
6	026	285	715	741	54
7	043	312	688	731	53
8	061	338	662	722	52
9	078	365	635	713	51
10	.77 095	.86 392	.13 608	.90 704	50
11	112	418	582	694	49
12	130	445	555	685	48
13	147	471	529	676	47
14	164	498	502	667	46
15	.77 181	.86 524	.13 476	.90 657	45
16	199	551	449	648	44
17	216	577	423	639	43
18	233	603	397	630	42
19	250	630	370	620	41
20	.77 268	.86 656	.13 344	.90 611	40
21	285	683	317	602	39
22	302	709	291	592	38
23	319	736	264	583	37
24	336	762	238	574	36
25	.77 353	.86 789	.13 211	.90 565	35
26	370	815	185	555	34
27	387	842	158	546	33
28	405	868	132	537	32
29	422	894	106	527	31
30	.77 439	.86 921	.13 079	.90 518	30
31	456	947	053	509	29
32	473	974	026	499	28
33	490	87 000	000	490	27
34	507	027	12 973	480	26
35	.77 524	.87 053	.12 947	.90 471	25
36	541	079	921	462	24
37	558	106	894	452	23
38	575	132	868	443	22
39	592	158	842	434	21
40	.77 609	.87 185	.12 815	.90 424	20
41	626	211	789	415	19
42	643	238	762	405	18
43	660	264	736	396	17
44	677	290	710	386	16
45	.77 694	.87 317	.12 683	.90 377	15
46	711	343	657	368	14
47	728	369	631	358	13
48	744	396	604	349	12
49	761	422	578	339	11
50	.77 778	.87 448	.12 552	.90 330	10
51	795	475	525	320	9
52	812	501	499	311	8
53	829	527	473	301	7
54	846	554	446	292	6
55	.77 862	.87 580	.12 420	.90 282	5
56	879	606	394	273	4
57	896	633	367	263	3
58	913	659	341	254	2
59	930	685	315	244	1
60	.77 946	.87 711	.12 289	.90 235	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

53°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462
84°-82°

9°-12°
.19 433
.19 971
.63 664
.98 872
77°-80°

13°-16°
.35 209
.36 336
.51 466
.98 060
73°-76°

17°-20°
.46 594
.48 534
.41 582
.97 015
69°-72°

21°-24°
.55 433
.58 418
.33 133
.95 728
65°-68°

25°-28°
.62 595
.66 867
.25 625
.94 182
61°-64°

29°-32°
.68 557
.74 375
.18 748
.92 359
57°-60°

33°-36°
.73 611
.81 252
.12 289
.90 235
53°-56°

37°-40°
.77 946
.87 711
.06 084
.87 778
49°-52°

37°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.77 946	.87 711	.12 289	.90 235	60
1	963	738	262	225	59
2	980	764	236	216	58
3	997	790	210	206	57
4	78 013	817	183	197	56
5	.78 030	.87 843	.12 157	.90 187	55
6	047	869	131	178	54
7	063	895	105	168	53
8	080	922	078	159	52
9	097	948	052	149	51
10	.78 113	.87 974	.12 026	.90 139	50
11	130	88 000	000	130	49
12	147	027	11 973	120	48
13	163	053	947	111	47
14	180	079	921	101	46
15	.78 197	.88 105	.11 895	.90 091	45
16	213	131	869	082	44
17	230	158	842	072	43
18	246	184	816	063	42
19	263	210	790	053	41
20	.78 280	.88 236	.11 764	.90 043	40
21	296	262	738	034	39
22	313	289	711	024	38
23	329	315	685	014	37
24	346	341	659	005	36
25	.78 362	.88 367	.11 633	.89 995	35
26	379	393	607	985	34
27	395	420	580	976	33
28	412	446	554	966	32
29	428	472	528	956	31
30	.78 445	.88 498	.11 502	.89 947	30
31	461	524	476	937	29
32	478	550	450	927	28
33	494	577	423	918	27
34	510	603	397	908	26
35	.78 527	.88 629	.11 371	.89 898	25
36	543	655	345	888	24
37	560	681	319	879	23
38	576	707	293	869	22
39	592	733	267	859	21
40	.78 609	.88 759	.11 241	.89 849	20
41	625	786	214	840	19
42	642	812	188	830	18
43	658	838	162	820	17
44	674	864	136	810	16
45	.78 691	.88 890	.11 110	.89 801	15
46	707	916	084	791	14
47	723	942	058	781	13
48	739	968	032	771	12
49	756	994	006	761	11
50	.78 772	.89 020	.10 980	.89 752	10
51	788	046	954	742	9
52	805	073	927	732	8
53	821	099	901	722	7
54	837	125	875	712	6
55	.78 853	.89 151	.10 849	.89 702	5
56	869	177	823	693	4
57	886	203	797	683	3
58	902	229	771	673	2
59	918	255	745	663	1
60	.78 934	.89 281	.10 719	.89 653	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

52°

38°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.78 934	.89 281	.10 719	.89 653	60
1	950	307	693	643	59
2	967	333	667	633	58
3	983	359	641	624	57
4	999	385	615	614	56
5	.79 015	.89 411	.10 589	.89 604	55
6	031	437	563	594	54
7	047	463	537	584	53
8	063	489	511	574	52
9	079	515	485	564	51
10	.79 095	.89 541	.10 459	.89 554	50
11	111	567	433	544	49
12	128	593	407	534	48
13	144	619	381	524	47
14	160	645	355	514	46
15	.79 176	.89 671	.10 329	.89 504	45
16	192	697	303	495	44
17	208	723	277	485	43
18	224	749	251	475	42
19	240	775	225	465	41
20	.79 256	.89 801	.10 199	.89 455	40
21	272	827	173	445	39
22	288	853	147	435	38
23	304	879	121	425	37
24	319	905	095	415	36
25	.79 335	.89 931	.10 069	.89 405	35
26	351	957	043	395	34
27	367	983	017	385	33
28	383	90 009	09 991	375	32
29	399	035	965	364	31
30	.79 415	.90 061	.09 939	.89 354	30
31	431	086	914	344	29
32	447	112	888	334	28
33	463	138	862	324	27
34	478	164	836	314	26
35	.79 494	.90 190	.09 810	.89 304	25
36	510	216	784	294	24
37	526	242	758	284	23
38	542	268	732	274	22
39	558	294	706	264	21
40	.79 573	.90 320	.09 680	.89 254	20
41	589	346	654	244	19
42	605	371	629	233	18
43	621	397	603	223	17
44	636	423	577	213	16
45	.79 652	.90 449	.09 551	.89 203	15
46	668	475	525	193	14
47	684	501	499	183	13
48	699	527	473	173	12
49	715	553	447	162	11
50	.79 731	.90 578	.09 422	.89 152	10
51	746	604	396	142	9
52	762	630	370	132	8
53	778	656	344	122	7
54	793	682	318	112	6
55	.79 809	.90 708	.09 292	.89 101	5
56	825	734	266	091	4
57	840	759	241	081	3
58	856	785	215	071	2
59	872	811	189	060	1
60	.79 887	.90 837	.09 163	.89 050	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

51°

39°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.79 887	.90 837	.09 163	.89 050	60
1	903	863	137	040	59
2	918	889	111	030	58
3	934	914	086	020	57
4	950	940	060	009	56
5	.79 965	.90 966	.09 034	.88 999	55
6	981	992	008	989	54
7	996	91 018	08 982	978	53
8	80 012	043	957	968	52
9	027	069	931	958	51
10	.80 043	.91 095	.08 905	.88 948	50
11	058	121	879	937	49
12	074	147	853	927	48
13	089	172	828	917	47
14	105	198	802	906	46
15	.80 120	.91 224	.08 776	.88 896	45
16	136	250	750	886	44
17	151	276	724	875	43
18	166	301	699	865	42
19	182	327	673	855	41
20	.80 197	.91 353	.08 647	.88 844	40
21	213	379	621	834	39
22	228	404	596	824	38
23	244	430	570	813	37
24	259	456	544	803	36
25	.80 274	.91 482	.08 518	.88 793	35
26	290	507	493	782	34
27	305	533	467	772	33
28	320	559	441	761	32
29	336	585	415	751	31
30	.80 351	.91 610	.08 390	.88 741	30
31	366	636	364	730	29
32	382	662	338	720	28
33	397	688	312	709	27
34	412	713	287	699	26
35	.80 428	.91 739	.08 261	.88 688	25
36	443	765	235	678	24
37	458	791	209	668	23
38	473	816	184	657	22
39	489	842	158	647	21
40	.80 504	.91 868	.08 132	.88 636	20
41	519	893	107	626	19
42	534	919	081	615	18
43	550	945	055	605	17
44	565	971	029	594	16
45	.80 580	.91 996	.08 004	.88 584	15
46	595	92 022	07 978	573	14
47	610	048	952	563	13
48	625	073	927	552	12
49	641	099	901	542	11
50	.80 656	.92 125	.07 875	.88 531	10
51	671	150	850	521	9
52	686	176	824	510	8
53	701	202	798	499	7
54	716	227	773	489	6
55	.80 731	.92 253	.07 747	.88 478	5
56	746	279	721	468	4
57	762	304	696	457	3
58	777	330	670	447	2
59	792	356	644	436	1
60	.80 807	.92 381	.07 619	.88 425	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

50°

40°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.80 807	.92 381	.07 619	.88 425	60
1	822	407	593	415	59
2	837	433	567	404	58
3	852	458	542	394	57
4	867	484	516	383	56
5	.80 882	.92 510	.07 490	.88 372	55
6	897	535	465	362	54
7	912	561	439	351	53
8	927	587	413	340	52
9	942	612	388	330	51
10	.80 957	.92 638	.07 362	.88 319	50
11	972	663	337	308	49
12	987	689	311	298	48
13	81 002	715	285	287	47
14	017	740	260	276	46
15	.81 032	.92 766	.07 234	.88 266	45
16	047	792	208	255	44
17	061	817	183	244	43
18	076	843	157	234	42
19	091	868	132	223	41
20	.81 106	.92 894	.07 106	.88 212	40
21	121	920	080	201	39
22	136	945	055	191	38
23	151	971	029	180	37
24	166	996	004	169	36
25	.81 180	.93 022	.06 978	.88 158	35
26	195	048	952	148	34
27	210	073	927	137	33
28	225	099	901	126	32
29	240	124	876	115	31
30	.81 254	.93 150	.06 850	.88 105	30
31	269	175	825	094	29
32	284	201	799	083	28
33	299	227	773	072	27
34	314	252	748	061	26
35	.81 328	.93 278	.06 722	.88 051	25
36	343	303	697	040	24
37	358	329	671	029	23
38	372	354	646	018	22
39	387	380	620	007	21
40	.81 402	.93 406	.06 594	.87 996	20
41	417	431	569	985	19
42	431	457	543	975	18
43	446	482	518	964	17
44	461	508	492	953	16
45	.81 475	.93 533	.06 467	.87 942	15
46	490	559	441	931	14
47	505	584	416	920	13
48	519	610	390	909	12
49	534	636	364	898	11
50	.81 549	.93 661	.06 339	.87 887	10
51	563	687	313	877	9
52	578	712	288	866	8
53	592	738	262	855	7
54	607	763	237	844	6
55	.81 622	.93 789	.06 211	.87 833	5
56	636	814	186	822	4
57	651	840	160	811	3
58	665	865	135	800	2
59	680	891	109	789	1
60	.81 694	.93 916	.06 084	.87 778	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

49°

1°-4°
2.2418
2.2419
1.0580
.99 834
85°-88°

5°-8°
2.9403
2.9419
.80 029
.99 462
81°-84°

9°-12°
.19 433
.19 971
.63 664
.98 872
77°-80°

13°-16°
.35 209
.36 336
.51 466
.98 060
73°-76°

17°-20°
.46 594
.48 534
.41 582
.97 015

21°-24°
.55 433
.58 418
.33 133
.95 728
65°-68°

25°-28°
.62 595
.66 867
.25 625
.94 182
61°-64°

29°-32°
.68 557
.74 375
.18 748
.92 359
57°-60°

33°-36°
.73 611
.81 252
.12 289
.90 235
53°-56°

37°-40°
.77 946
.87 711
.06 084
.87 778
49°-52°

41°-44°
.81 694
.93 916
.00 000
.84 949
45°-48°

41°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.81 694	.93 916	.06 084	.87 778	60
1	709	942	058	767	59
2	723	967	033	756	58
3	738	993	007	745	57
4	752	94 018	05 982	734	56
5	.81 767	.94 044	.05 956	.87 723	55
6	781	069	931	712	54
7	796	095	905	701	53
8	810	120	880	690	52
9	825	146	854	679	51
10	.81 839	.94 171	.05 829	.87 668	50
11	854	197	803	657	49
12	868	222	778	646	48
13	882	248	752	635	47
14	897	273	727	624	46
15	.81 911	.94 299	.05 701	.87 613	45
16	926	324	676	601	44
17	940	350	650	590	43
18	955	375	625	579	42
19	969	401	599	568	41
20	.81 983	.94 426	.05 574	.87 557	40
21	998	452	548	546	39
22	82 012	477	523	535	38
23	026	503	497	524	37
24	041	528	472	513	36
25	.82 055	.94 554	.05 446	.87 501	35
26	069	579	421	490	34
27	084	604	396	479	33
28	098	630	370	468	32
29	112	655	345	457	31
30	.82 126	.94 681	.05 319	.87 446	30
31	141	706	294	434	29
32	155	732	268	423	28
33	169	757	243	412	27
34	184	783	217	401	26
35	.82 198	.94 808	.05 192	.87 390	25
36	212	834	166	378	24
37	226	859	141	367	23
38	240	884	116	356	22
39	255	910	090	345	21
40	.82 269	.94 935	.05 065	.87 334	20
41	283	961	039	322	19
42	297	986	014	311	18
43	311	95 012	04 988	300	17
44	326	037	963	288	16
45	.82 340	.95 062	.04 938	.87 277	15
46	354	088	912	266	14
47	368	113	887	255	13
48	382	139	861	243	12
49	396	164	836	232	11
50	.82 410	.95 190	.04 810	.87 221	10
51	424	215	785	209	9
52	439	240	760	198	8
53	453	266	734	187	7
54	467	291	709	175	6
55	.82 481	.95 317	.04 683	.87 164	5
56	495	342	658	153	4
57	509	368	632	141	3
58	523	393	607	130	2
59	537	418	582	119	1
60	.82 551	.95 444	.04 556	.87 107	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

42°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.82 551	.95 444	.04 556	.87 107	60
1	565	469	531	096	59
2	579	495	505	085	58
3	593	520	480	073	57
4	607	545	455	062	56
5	.82 621	.95 571	.04 429	.87 050	55
6	635	596	404	039	54
7	649	622	378	028	53
8	663	647	353	016	52
9	677	672	328	005	51
10	.82 691	.95 698	.04 302	.86 993	50
11	705	723	277	982	49
12	719	748	252	970	48
13	733	774	226	959	47
14	747	799	201	947	46
15	.82 761	.95 825	.04 175	.86 936	45
16	775	850	150	924	44
17	788	875	125	913	43
18	802	901	099	902	42
19	816	926	074	890	41
20	.82 830	.95 952	.04 048	.86 879	40
21	844	977	023	867	39
22	858	96 002	03 998	855	38
23	872	028	972	844	37
24	885	053	947	832	36
25	.82 899	.96 078	.03 922	.86 821	35
26	913	104	896	809	34
27	927	129	871	798	33
28	941	155	845	786	32
29	955	180	820	775	31
30	.82 968	.96 205	.03 795	.86 763	30
31	982	231	769	752	29
32	996	256	744	740	28
33	83 010	281	719	728	27
34	023	307	693	717	26
35	.83 037	.96 332	.03 668	.86 705	25
36	051	357	643	694	24
37	065	383	617	682	23
38	078	408	592	670	22
39	092	433	567	659	21
40	.83 106	.96 459	.03 541	.86 647	20
41	120	484	516	635	19
42	133	510	490	624	18
43	147	535	465	612	17
44	161	560	440	600	16
45	.83 174	.96 586	.03 414	.86 589	15
46	188	611	389	577	14
47	202	636	364	565	13
48	215	662	338	554	12
49	229	687	313	542	11
50	.83 242	.96 712	.03 288	.86 530	10
51	256	738	262	518	9
52	270	763	237	507	8
53	283	788	212	495	7
54	297	814	186	483	6
55	.83 310	.96 839	.03 161	.86 472	5
56	324	864	136	460	4
57	338	890	110	448	3
58	351	915	085	436	2
59	365	940	060	425	1
60	.83 378	.96 966	.03 034	.86 413	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

48°

47°

43°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.83 378	.96 966	.03 034	.86 413	60
1	392	991	009	401	59
2	405	97 016	02 984	389	58
3	419	042	958	377	57
4	432	067	933	366	56
5	.83 446	.97 092	.02 908	.86 354	55
6	459	118	882	342	54
7	473	143	857	330	53
8	486	168	832	318	52
9	500	193	807	306	51
10	.83 513	.97 219	.02 781	.86 295	50
11	527	244	756	283	49
12	540	269	731	271	48
13	554	295	705	259	47
14	567	320	680	247	46
15	.83 581	.97 345	.02 655	.86 235	45
16	594	371	629	223	44
17	608	396	604	211	43
18	621	421	579	200	42
19	634	447	553	188	41
20	.83 648	.97 472	.02 528	.86 176	40
21	661	497	503	164	39
22	674	523	477	152	38
23	688	548	452	140	37
24	701	573	427	128	36
25	.83 715	.97 598	.02 402	.86 116	35
26	728	624	376	104	34
27	741	649	351	092	33
28	755	674	326	080	32
29	768	700	300	068	31
30	.83 781	.97 725	.02 275	.86 056	30
31	795	750	250	044	29
32	808	776	224	032	28
33	821	801	199	020	27
34	834	826	174	008	26
35	.83 848	.97 851	.02 149	.85 996	25
36	861	877	123	984	24
37	874	902	098	972	23
38	887	927	073	960	22
39	901	953	047	948	21
40	.83 914	.97 978	.02 022	.85 936	20
41	927	98 003	01 997	924	19
42	940	029	971	912	18
43	954	054	946	900	17
44	967	079	921	888	16
45	.83 980	.98 104	.01 896	.85 876	15
46	993	130	870	864	14
47	84 006	155	845	851	13
48	020	180	820	839	12
49	033	206	794	827	11
50	.84 046	.98 231	.01 769	.85 815	10
51	059	256	744	803	9
52	072	281	719	791	8
53	085	307	693	779	7
54	098	332	668	766	6
55	.84 112	.98 357	.01 643	.85 754	5
56	125	383	617	742	4
57	138	408	592	730	3
58	151	433	567	718	2
59	164	458	542	706	1
60	.84 177	.98 484	.01 516	.85 693	0
	9–10	9–10	0	9–10	
′	log cos	log cot	log tan	log sin	′

44°

′	log sin	log tan	log cot	log cos	′
	9–10	9–10	0	9–10	
0	.84 177	.98 484	.01 516	.85 693	60
1	190	509	491	681	59
2	203	534	466	669	58
3	216	560	440	657	57
4	229	585	415	645	56
5	.84 242	.98 610	.01 390	.85 632	55
6	255	635	365	620	54
7	269	661	339	608	53
8	282	686	314	596	52
9	295	711	289	583	51
10	.84 308	.98 737	.01 263	.85 571	50
11	321	762	238	559	49
12	334	787	213	547	48
13	347	812	188	534	47
14	360	838	162	522	46
15	.84 373	.98 863	.01 137	.85 510	45
16	385	888	112	497	44
17	398	913	087	485	43
18	411	939	061	473	42
19	424	964	036	460	41
20	.84 437	.98 989	.01 011	.85 448	40
21	450	99 015	00 985	436	39
22	463	040	960	423	38
23	476	065	935	411	37
24	489	090	910	399	36
25	.84 502	.99 116	.00 884	.85 386	35
26	515	141	859	374	34
27	528	166	834	361	33
28	540	191	809	349	32
29	553	217	783	337	31
30	.84 566	.99 242	.00 758	.85 324	30
31	579	267	733	312	29
32	592	293	707	299	28
33	605	318	682	287	27
34	618	343	657	274	26
35	.84 630	.99 368	.00 632	.85 262	25
36	643	394	606	250	24
37	656	419	581	237	23
38	669	444	556	225	22
39	682	469	531	212	21
40	.84 694	.99 495	.00 505	.85 200	20
41	707	520	480	187	19
42	720	545	455	175	18
43	733	570	430	162	17
44	745	596	404	150	16
45	.84 758	.99 621	.00 379	.85 137	15
46	771	646	354	125	14
47	784	672	328	112	13
48	796	697	303	100	12
49	809	722	278	087	11
50	.84 822	.99 747	.00 253	.85 074	10
51	835	773	227	062	9
52	847	798	202	049	8
53	860	823	177	037	7
54	873	848	152	024	6
55	.84 885	.99 874	.00 126	.85 012	5
56	898	899	101	84 999	4
57	911	924	076	986	3
58	923	949	051	974	2
59	936	975	025	961	1
60	.84 949	.00 000	.00 000	.84 949	0
	9–10	0	0	9–10	
′	log cos	log cot	log tan	log sin	′

46°

45°

TABLE IV

THE LOGARITHMS

OF THE

TRIGONOMETRIC FUNCTIONS OF ANGLES

From 0′ to 3′ and 89° 57′ to 90°, for every second
From 3′ to 2° and 88° to 89° 57′, for every ten seconds

$\log \cos A = 0.00\,000$, when $0' < A < 16'$
$\log \sin A = 0.00\,000$, when $89°\,44' < A < 90°$
$\log \tan A + \log \cot A \equiv 0$

	log sin			0°		log sin			
″	0′	1′	2′	″	″	0′	1′	2′	″
		6-10	6-10			6-10	6-10	6-10	
0	——	.46 373	.76 476	60	30	.16 270	.63 982	.86 167	30
1	$\bar{6}$.68 557	47 090	836	59	31	17 694	64 462	455	29
2	98 660	797	77 193	58	32	19 072	936	742	28
3	$\bar{5}$ 16 270	48 492	548	57	33	20 409	65 406	87 027	27
4	28 763	49 175	900	56	34	21 705	870	310	26
5	$\bar{5}$.38 454	.49 849	.78 248	55	35	.22 964	.66 330	.87 591	25
6	46 373	50 512	595	54	36	24 188	785	870	24
7	53 067	51 165	938	53	37	25 378	67 235	88 147	23
8	58 866	808	79 278	52	38	26 536	680	423	22
9	63 982	52 442	616	51	39	27 664	68 121	697	21
10	$\bar{5}$.68 557	.53 067	.79 952	50	40	.28 763	.68 557	.88 969	20
11	72 697	683	80 285	49	41	29 836	990	89 240	19
12	76 476	54 291	615	48	42	30 882	69 418	509	18
13	79 952	890	943	47	43	31 904	841	776	17
14	83 170	55 481	81 268	46	44	32 903	70 261	90 042	16
15	$\bar{5}$.86 167	.56 064	.81 591	45	45	.33 879	.70 676	.90 306	15
16	88 969	639	911	44	46	34 833	71 088	568	14
17	91 602	57 207	82 230	43	47	35 767	496	829	13
18	94 085	767	545	42	48	36 682	900	91 088	12
19	96 433	58 320	859	41	49	37 577	72 300	346	11
20	$\bar{5}$.98 660	.58 866	.83 170	40	50	.38 454	.72 697	.91 602	10
21	$\bar{4}$ 00 779	59 406	479	39	51	39 315	73 090	857	9
22	02 800	939	786	38	52	40 158	479	92 110	8
23	04 730	60 465	84 091	37	53	985	865	362	7
24	06 579	985	394	36	54	41 797	74 248	612	6
25	$\bar{4}$.08 351	.61 499	.84 694	35	55	.42 594	.74 627	.92 861	5
26	10 055	62 007	993	34	56	43 376	75 003	93 109	4
27	11 694	509	85 289	33	57	44 145	376	355	3
28	13 273	63 006	584	32	58	900	746	599	2
29	14 797	496	876	31	59	45 643	76 112	843	1
30	$\bar{4}$.16 270	.63 982	.86 167	30	60	.46 373	.76 476	.94 085	0
	——	6-10	6-10			6-10	6-10	6-10	
″	59′	58′	57′	″	″	59′	58′	57′	″
	log cos			89°		log cos			

0′–20′
$\bar{6}$.68 55
$\bar{6}$.68 55
1.99 99
89° 40′
–90°

When the given angle is less than 3′ or greater than 89° 57′, or when the given logarithmic function is less than 6.94085–10, consult the page opposite.

′ ″	log sin 6–10	log tan 6–10	log cos 0	″ ′
3 0	.94 085	.94 085	.00 000	0 57
10	96 433	96 433	000	50
20	98 660	98 661	000	40
30	00 779	00 779	000	30
40	02 800	02 800	000	20
50	04 730	04 730	000	10
4 0	.06 579	.06 579	.00 000	0 56
10	08 351	08 352	000	50
20	10 055	10 055	000	40
30	11 694	11 694	000	30
40	13 273	13 273	000	20
50	14 797	14 797	000	10
5 0	.16 270	.16 270	.00 000	0 55
10	17 694	17 694	000	50
20	19 072	19 073	000	40
30	20 409	20 409	000	30
40	21 705	21 705	000	20
50	22 964	22 964	000	10
6 0	.24 188	.24 188	.00 000	0 54
10	25 378	25 378	000	50
20	26 536	26 536	000	40
30	27 664	27 664	000	30
40	28 763	28 764	000	20
50	29 836	29 836	000	10
7 0	.30 882	.30 882	.00 000	0 53
10	31 904	31 904	000	50
20	32 903	32 903	000	40
30	33 879	33 879	000	30
40	34 833	34 833	000	20
50	35 767	35 767	000	10
8 0	.36 682	.36 682	.00 000	0 52
10	37 577	37 577	000	50
20	38 454	38 455	000	40
30	39 314	39 315	000	30
40	40 158	40 158	000	20
50	985	985	000	10
9 0	.41 797	.41 797	.00 000	0 51
10	42 594	42 594	000	50
20	43 376	43 376	000	40
30	44 145	44 145	000	30
40	900	900	000	20
50	45 643	45 643	000	10
10 0	.46 373	.46 373	.00 000	0 50
′ ″	7–10 log cos	7–10 log cot	0 log sin	″ ′

′ ″	log sin 7–10	log tan 7–10	log cos 0	″ ′
10 0	.46 373	.46 373	.00 000	0 50
10	47 090	47 091	000	50
20	797	797	000	40
30	48 491	48 492	000	30
40	49 175	49 176	000	20
50	849	849	000	10
11 0	.50 512	.50 512	.00 000	0 49
10	51 165	51 165	000	50
20	808	809	000	40
30	52 442	52 443	000	30
40	53 067	53 067	000	20
50	683	683	000	10
12 0	.54 291	.54 291	.00 000	0 48
10	890	890	000	50
20	55 481	55 481	000	40
30	56 064	56 064	000	30
40	639	639	000	20
50	57 206	57 207	000	10
13 0	.57 767	.57 767	.00 000	0 47
10	58 320	58 320	000	50
20	866	867	000	40
30	59 406	59 406	000	30
40	939	939	000	20
50	60 465	60 466	000	10
14 0	.60 985	.60 986	.00 000	0 46
10	61 499	61 500	000	50
20	62 007	62 008	000	40
30	509	510	000	30
40	63 006	63 006	000	20
50	496	497	000	10
15 0	.63 982	.63 982	.00 000	0 45
10	64 461	64 462	000	50
20	936	937	000	40
30	65 406	65 406	000	30
40	870	871	000	20
50	66 330	66 330	000	10
16 0	.66 784	.66 785	.00 000	0 44
10	67 235	67 235	000	50
20	680	680	000	40
30	68 121	68 121	000	30
40	557	558	99 999	20
50	989	990	999	10
17 0	.69 417	.69 418	.99 999	0 43
10	841	842	999	50
20	70 261	70 261	999	40
30	676	677	999	30
40	71 088	71 088	999	20
50	496	496	999	10
18 0	.71 900	.71 900	.99 999	0 42
10	72 300	72 301	999	50
20	697	697	999	40
30	73 090	73 090	999	30
40	479	480	999	20
50	865	866	999	10
19 0	.74 248	.74 248	.99 999	0 41
10	627	628	999	50
20	75 003	75 004	999	40
30	376	377	999	30
40	745	746	999	20
50	76 112	76 113	999	10
20 0	.76 475	.76 476	.99 999	0 40
′ ″	7–10 log cos	7–10 log cot	9–10 log sin	″ ′

′ ″	log sin 7–10	log tan 7–10	log cos 9–10	″ ′	′ ″	log sin 7–10	log tan 7–10	log cos 9–10	″ ′
20 0	.76 475	.76 476	.99 999	0 **40**	**30** 0	.94 084	.94 086	.99 998	0 **30**
10	836	837	999	50	10	325	326	998	50
20	77 193	77 194	999	40	20	564	566	998	40
30	548	549	999	30	30	802	804	998	30
40	899	900	999	20	40	95 039	95 040	998	20
50	78 248	78 249	999	10	50	274	276	998	10
21 0	.78 594	.78 595	.99 999	0 **39**	**31** 0	.95 508	.95 510	.99 998	0 **29**
10	938	938	999	50	10	741	743	998	50
20	79 278	79 279	999	40	20	973	974	998	40
30	616	617	999	30	30	96 203	96 205	998	30
40	952	952	999	20	40	432	434	998	20
50	80 284	80 285	999	10	50	660	662	998	10
22 0	.80 615	.80 615	.99 999	0 **38**	**32** 0	.96 887	.96 889	.99 998	0 **28**
10	942	943	999	50	10	97 113	97 114	998	50
20	81 268	81 269	999	40	20	337	339	998	40
30	591	591	999	30	30	560	562	998	30
40	911	912	999	20	40	782	784	998	20
50	82 229	82 230	999	10	50	98 003	98 005	998	10
23 0	.82 545	.82 546	.99 999	0 **37**	**33** 0	.98 223	.98 225	.99 998	0 **27**
10	859	860	999	50	10	442	444	998	50
20	83 170	83 171	999	40	20	660	662	998	40
30	479	480	999	30	30	876	878	998	30
40	786	787	999	20	40	99 092	99 094	998	20
50	84 091	84 092	999	10	50	306	308	998	10
24 0	.84 393	.84 394	.99 999	0 **36**	**34** 0	.99 520	.99 522	.99 998	0 **26**
10	694	695	999	50	10	732	734	998	50
20	992	993	999	40	20	943	946	998	40
30	85 289	85 290	999	30	30	00 154	00 156	998	30
40	583	584	999	20	40	363	365	998	20
50	876	877	999	10	50	571	574	998	10
25 0	.86 166	.86 167	.99 999	0 **35**	**35** 0	.00 779	.00 781	.99 998	0 **25**
10	455	456	999	50	10	985	987	998	50
20	741	743	999	40	20	01 190	01 193	998	40
30	87 026	87 027	999	30	30	395	397	998	30
40	309	310	999	20	40	598	600	998	20
50	590	591	999	10	50	801	803	998	10
26 0	.87 870	.87 871	.99 999	0 **34**	**36** 0	.02 002	.02 004	.99 998	0 **24**
10	88 147	88 148	999	50	10	203	205	998	50
20	423	424	999	40	20	402	405	998	40
30	697	698	999	30	30	601	604	998	30
40	969	970	999	20	40	799	801	998	20
50	89 240	89 241	999	10	50	996	998	998	10
27 0	.89 509	.89 510	.99 999	0 **33**	**37** 0	.03 192	.03 194	.99 997	0 **23**
10	776	777	999	50	10	387	390	997	50
20	90 041	90 043	999	40	20	581	584	997	40
30	305	307	999	30	30	775	777	997	30
40	568	569	999	20	40	967	970	997	20
50	829	830	999	10	50	04 159	04 162	997	10
28 0	.91 088	.91 089	.99 999	0 **32**	**38** 0	.04 350	.04 353	.99 997	0 **22**
10	346	347	999	50	10	540	543	997	50
20	602	603	999	40	20	729	732	997	40
30	857	858	999	30	30	918	921	997	30
40	92 110	92 111	998	20	40	05 105	05 108	997	20
50	362	363	998	10	50	292	295	997	10
29 0	.92 612	.92 613	.99 998	0 **31**	**39** 0	.05 478	.05 481	.99 997	0 **21**
10	861	862	998	50	10	663	666	997	50
20	93 108	93 110	998	40	20	848	851	997	40
30	354	356	998	30	30	06 031	06 034	997	30
40	599	601	998	20	40	214	217	997	20
50	842	844	998	10	50	396	399	997	10
30 0	.94 084	.94 086	.99 998	0 **30**	**40** 0	.06 578	.06 581	.99 997	0 **20**
′ ″	7–10 log cos	7–10 log cot	9–10 log sin	″ ′	′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′

0′–20′
6.68 55
6.68 55
1.99 99
89° 40′
–90°

20′–60′
3.76 47
3.76 47
1.99 99
89°–
89° 40′

′ ″	log sin 8–10	log tan 8–10	log cos 9–10	″ ′	′ ″	log sin 8–10	log tan 8–10	log cos 9–10	″ ′
40 0	.06 578	.06 581	.99 997	0 **20**	**50** 0	.16 268	.16 273	.99 995	0 **10**
10	758	761	997	50	10	413	417	995	50
20	938	941	997	40	20	557	561	995	40
30	07 117	07 120	997	30	30	700	705	995	30
40	295	299	997	20	40	843	848	995	20
50	473	476	997	10	50	986	991	995	10
41 0	.07 650	.07 653	.99 997	0 **19**	**51** 0	.17 128	.17 133	.99 995	0 **9**
10	826	829	997	50	10	270	275	995	50
20	08 002	08 005	997	40	20	411	416	995	40
30	176	180	997	30	30	552	557	995	30
40	350	354	997	20	40	692	697	995	20
50	524	527	997	10	50	832	837	995	10
42 0	.08 696	.08 700	.99 997	0 **18**	**52** 0	.17 971	.17 976	.99 995	0 **8**
10	868	872	997	50	10	18 110	18 115	995	50
20	09 040	09 043	997	40	20	249	254	995	40
30	210	214	997	30	30	387	392	995	30
40	380	384	997	20	40	524	530	995	20
50	550	553	997	10	50	662	667	995	10
43 0	.09 718	.09 722	.99 997	0 **17**	**53** 0	.18 798	.18 804	.99 995	0 **7**
10	886	890	997	50	10	935	940	995	50
20	10 054	10 057	997	40	20	19 071	19 076	995	40
30	220	224	997	30	30	206	211	995	30
40	386	390	996	20	40	341	347	995	20
50	552	555	996	10	50	476	481	995	10
44 0	.10 717	.10 720	.99 996	0 **16**	**54** 0	.19 610	.19 616	.99 995	0 **6**
10	881	884	996	50	10	744	749	995	50
20	11 044	11 048	996	40	20	877	883	995	40
30	207	211	996	30	30	20 010	20 016	995	30
40	370	373	996	20	40	143	149	995	20
50	531	535	996	10	50	275	281	994	10
45 0	.11 693	.11 696	.99 996	0 **15**	**55** 0	.20 407	.20 413	.99 994	0 **5**
10	853	857	996	50	10	538	544	994	50
20	12 013	12 017	996	40	20	669	675	994	40
30	172	176	996	30	30	800	806	994	30
40	331	335	996	20	40	930	936	994	20
50	489	493	996	10	50	21 060	21 066	994	10
46 0	.12 647	.12 651	.99 996	0 **14**	**56** 0	.21 189	.21 195	.99 994	0 **4**
10	804	808	996	50	10	319	324	994	50
20	961	965	996	40	20	447	453	994	40
30	13 117	13 121	996	30	30	576	581	994	30
40	272	276	996	20	40	703	709	994	20
50	427	431	996	10	50	831	837	994	10
47 0	.13 581	13 585	.99 996	0 **13**	**57** 0	.21 958	.21 964	.99 994	0 **3**
10	735	739	996	50	10	22 085	22 091	994	50
20	888	892	996	40	20	211	217	994	40
30	14 041	14 045	996	30	30	337	343	994	30
40	193	197	996	20	40	463	469	994	20
50	344	348	996	10	50	588	595	994	10
48 0	.14 495	14 500	.99 996	0 **12**	**58** 0	.22 713	.22 720	.99 994	0 **2**
10	646	650	996	50	10	838	844	994	50
20	796	800	996	40	20	962	968	994	40
30	945	950	996	30	30	23 086	23 092	994	30
40	15 094	15 099	996	20	40	210	216	994	20
50	243	247	996	10	50	333	339	994	10
49 0	.15 391	.15 395	.99 996	0 **11**	**59** 0	.23 456	.23 462	.99 994	0 **1**
10	538	543	996	50	10	578	585	994	50
20	685	690	996	40	20	700	707	994	40
30	832	836	995	30	30	822	829	993	30
40	978	982	995	20	40	944	950	993	20
50	16 123	16 128	995	10	50	24 065	24 071	993	10
50 0	.16 268	.16 273	.99 995	0 **10**	**60** 0	.24 186	.24 192	.99 993	0 **0**
′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′	′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′

′ ″	log sin 8–10	log tan 8–10	log cos 9–10	″ ′	′ ″	log sin 8–10	log tan 8–10	log cos 9–10	″ ′
0 0	.24 186	.24 192	.99 993	0 60	10 0	.30 879	.30 888	.99 991	0 50
10	306	313	993	50	10	983	992	991	50
20	426	433	993	40	20	31 086	31 095	991	40
30	546	553	993	30	30	188	198	991	30
40	665	672	993	20	40	291	300	991	20
50	785	791	993	10	50	393	403	991	10
1 0	.24 903	.24 910	.99 993	0 59	11 0	.31 495	.31 505	.99 991	0 49
10	25 022	25 029	993	50	10	597	606	991	50
20	140	147	993	40	20	699	708	991	40
30	258	265	993	30	30	800	809	991	30
40	375	382	993	20	40	901	911	991	20
50	493	500	993	10	50	32 002	32 012	991	10
2 0	.25 609	.25 616	.99 993	0 58	12 0	.32 103	.32 112	.99 990	0 48
10	726	733	993	50	10	203	213	990	50
20	842	849	993	40	20	303	313	990	40
30	958	965	993	30	30	403	413	990	30
40	26 074	26 081	993	20	40	503	513	990	20
50	189	196	993	10	50	602	612	990	10
3 0	.26 304	.26 312	.99 993	0 57	13 0	.32 702	.32 711	.99 990	0 47
10	419	426	993	50	10	801	810	990	50
20	533	541	993	40	20	899	909	990	40
30	648	655	993	30	30	998	33 008	990	30
40	761	769	993	20	40	33 096	106	990	20
50	875	882	993	10	50	195	205	990	10
4 0	.26 988	.26 996	.99 992	0 56	14 0	.33 292	.33 302	.99 990	0 46
10	27 101	27 109	992	50	10	390	400	990	50
20	214	221	992	40	20	488	498	990	40
30	326	334	992	30	30	585	595	990	30
40	438	446	992	20	40	682	692	990	20
50	550	558	992	10	50	779	789	990	10
5 0	.27 661	.27 669	.99 992	0 55	15 0	.33 875	.33 886	.99 990	0 45
10	773	780	992	50	10	972	982	990	50
20	883	891	992	40	20	34 068	34 078	990	40
30	994	28 002	992	30	30	164	174	990	30
40	28 104	112	992	20	40	260	270	989	20
50	215	223	992	10	50	355	366	989	10
6 0	.28 324	.28 332	.99 992	0 54	16 0	.34 450	.34 461	.99 989	0 44
10	434	442	992	50	10	546	556	989	50
20	543	551	992	40	20	640	651	989	40
30	652	660	992	30	30	735	746	989	30
40	761	769	992	20	40	830	840	989	20
50	869	877	992	10	50	924	935	989	10
7 0	.28 977	.28 986	.99 992	0 53	17 0	.35 018	.35 029	.99 989	0 43
10	29 085	29 094	992	50	10	112	123	989	50
20	193	201	992	40	20	206	217	989	40
30	300	309	992	30	30	299	310	989	30
40	407	416	992	20	40	392	403	989	20
50	514	523	992	10	50	485	497	989	10
8 0	.29 621	.29 629	.99 992	0 52	18 0	.35 578	.35 590	.99 989	0 42
10	727	736	991	50	10	671	682	989	50
20	833	842	991	40	20	764	775	989	40
30	939	947	991	30	30	856	867	989	30
40	30 044	30 053	991	20	40	948	959	989	20
50	150	158	991	10	50	36 040	36 051	989	10
9 0	.30 255	.30 263	.99 991	0 51	19 0	.36 131	.36 143	.99 989	0 41
10	359	368	991	50	10	223	235	988	50
20	464	473	991	40	20	314	326	988	40
30	568	577	991	30	30	405	417	988	30
40	672	681	991	20	40	496	508	988	20
50	776	785	991	10	50	587	599	988	10
10 0	.30 879	.30 888	.99 991	0 50	20 0	.36 678	.36 689	.99 988	0 40
′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′	′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′

0′–20′
6.68 55
6.68 55
1.99 99
89° 40′
–90°

20′–60′
3.76 47
3.76 47
1.99 99
89°–
89° 40′

1°–1° 40′
2.24 18
2.24 19
1.99 98
88° 20′
–89°

′ ″	log sin	log tan	log cos	″ ′	′ ″	log sin	log tan	log cos	″ ′
	8–10	8–10	9–10			8–10	8–10	9–10	
20 0	.36 678	.36 689	.99 988	0 **40**	**30** 0	.41 792	.41 807	.99 985	0 **30**
10	768	780	988	50	10	872	887	985	50
20	858	870	988	40	20	952	967	985	40
30	948	960	988	30	30	42 032	42 048	985	30
40	37 038	37 050	988	20	40	112	127	985	20
50	128	140	988	10	50	192	207	985	10
21 0	.37 217	.37 229	.99 988	0 **39**	**31** 0	.42 272	.42 287	.99 985	0 **29**
10	306	318	988	50	10	351	366	985	50
20	395	408	988	40	20	430	446	985	40
30	484	497	988	30	30	510	525	985	30
40	573	585	988	20	40	589	604	985	20
50	662	674	988	10	50	667	683	985	10
22 0	.37 750	.37 762	.99 988	0 **38**	**32** 0	.42 746	.42 762	.99 984	0 **28**
10	838	850	988	50	10	825	840	984	50
20	926	938	988	40	20	903	919	984	40
30	38 014	38 026	987	30	30	982	997	984	30
40	101	114	987	20	40	43 060	43 075	984	20
50	189	202	987	10	50	138	154	984	10
23 0	.38 276	.38 289	.99 987	0 **37**	**33** 0	.43 216	.43 232	.99 984	0 **27**
10	363	376	987	50	10	293	309	984	50
20	450	463	987	40	20	371	387	984	40
30	537	550	987	30	30	448	464	984	30
40	624	636	987	20	40	526	542	984	20
50	710	723	987	10	50	603	619	984	10
24 0	.38 796	.38 809	.99 987	0 **36**	**34** 0	.43 680	.43 696	.99 984	0 **26**
10	882	895	987	50	10	757	773	984	50
20	968	981	987	40	20	834	850	984	40
30	39 054	39 067	987	30	30	910	927	984	30
40	139	153	987	20	40	987	44 003	984	20
50	225	238	987	10	50	44 063	080	983	10
25 0	.39 310	.39 323	.99 987	0 **35**	**35** 0	.44 139	.44 156	.99 983	0 **25**
10	395	408	987	50	10	216	232	983	50
20	480	493	987	40	20	292	308	983	40
30	565	578	987	30	30	367	384	983	30
40	649	663	987	20	40	443	460	983	20
50	734	747	986	10	50	519	536	983	10
26 0	.39 818	.39 832	.99 986	0 **34**	**36** 0	.44 594	.44 611	.99 983	0 **24**
10	902	916	986	50	10	669	686	983	50
20	986	40 000	986	40	20	745	762	983	40
30	40 070	083	986	30	30	820	837	983	30
40	153	167	986	20	40	895	912	983	20
50	237	250	986	10	50	969	987	983	10
27 0	.40 320	.40 334	.99 986	0 **33**	**37** 0	.45 044	.45 061	.99 983	0 **23**
10	403	417	986	50	10	119	136	983	50
20	486	500	986	40	20	193	210	983	40
30	569	583	986	30	30	267	285	983	30
40	651	665	986	20	40	341	359	982	20
50	734	748	986	10	50	415	433	982	10
28 0	.40 816	.40 830	.99 986	0 **32**	**38** 0	.45 489	.45 507	.99 982	0 **22**
10	898	913	986	50	10	563	581	982	50
20	980	995	986	40	20	637	655	982	40
30	41 062	41 077	986	30	30	710	728	982	30
40	144	158	986	20	40	784	802	982	20
50	225	240	985	10	50	857	875	982	10
29 0	.41 307	.41 321	.99 985	0 **31**	**39** 0	.45 930	.45 948	.99 982	0 **21**
10	388	403	985	50	10	46 003	46 021	982	50
20	469	484	985	40	20	076	094	982	40
30	550	565	985	30	30	149	167	982	30
40	631	646	985	20	40	222	240	982	20
50	711	726	985	10	50	294	312	982	10
30 0	.41 792	.41 807	.99 985	0 **30**	**40** 0	.46 366	.46 385	.99 982	0 **20**
′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′	′ ″	8–10 log cos	8–10 log cot	9–10 log sin	″ ′

′ ″	log sin	log tan	log cos	″ ′	′ ″	log sin	log tan	log cos	″ ′
	8–10	8–10	9–10			8–10	8–10	9–10	
40 0	.46 366	.46 385	.99 982	0 **20**	**50** 0	.50 504	.50 527	.99 978	0 **10**
10	439	457	982	50	10	570	593	978	50
20	511	529	982	40	20	636	658	978	40
30	583	602	981	30	30	701	724	978	30
40	655	674	981	20	40	767	789	977	20
50	727	745	981	10	50	832	855	977	10
41 0	.46 799	.46 817	.99 981	0 **19**	**51** 0	.50 897	.50 920	.99 977	0 **9**
10	870	889	981	50	10	963	985	977	50
20	942	960	981	40	20	51 028	51 050	977	40
30	47 013	47 032	981	30	30	092	115	977	30
40	084	103	981	20	40	157	180	977	20
50	155	174	981	10	50	222	245	977	10
42 0	.47 226	.47 245	.99 981	0 **18**	**52** 0	.51 287	.51 310	.99 977	0 **8**
10	297	316	981	50	10	351	374	977	50
20	368	387	981	40	20	416	439	977	40
30	439	458	981	30	30	480	503	977	30
40	509	528	981	20	40	544	568	977	20
50	580	599	981	10	50	609	632	977	10
43 0	.47 650	.47 669	.99 981	0 **17**	**53** 0	.51 673	.51 696	.99 977	0 **7**
10	720	740	980	50	10	737	760	976	50
20	790	810	980	40	20	801	824	976	40
30	860	880	980	30	30	864	888	976	30
40	930	950	980	20	40	928	952	976	20
50	48 000	48 020	980	10	50	992	52 015	976	10
44 0	.48 069	.48 089	.99 980	0 **16**	**54** 0	.52 055	.52 079	.99 976	0 **6**
10	139	159	980	50	10	119	143	976	50
20	208	228	980	40	20	182	206	976	40
30	278	298	980	30	30	245	269	976	30
40	347	367	980	20	40	308	332	976	20
50	416	436	980	10	50	371	396	976	10
45 0	.48 485	.48 505	.99 980	0 **15**	**55** 0	.52 434	.52 459	.99 976	0 **5**
10	554	574	980	50	10	497	522	976	50
20	622	643	980	40	20	560	584	976	40
30	691	711	980	30	30	623	647	975	30
40	760	780	979	20	40	685	710	975	20
50	828	849	979	10	50	748	772	975	10
46 0	.48 896	.48 917	.99 979	0 **14**	**56** 0	.52 810	.52 835	.99 975	0 **4**
10	965	985	979	50	10	872	897	975	50
20	49 033	49 053	979	40	20	935	960	975	40
30	101	121	979	30	30	997	53 022	975	30
40	169	189	979	20	40	53 059	084	975	20
50	236	257	979	10	50	121	146	975	10
47 0	.49 304	.49 325	.99 979	0 **13**	**57** 0	.53 183	.53 208	.99 975	0 **3**
10	372	393	979	50	10	245	270	975	50
20	439	460	979	40	20	306	332	975	40
30	506	528	979	30	30	368	393	975	30
40	574	595	979	20	40	429	455	975	20
50	641	662	979	10	50	491	516	974	10
48 0	.49 708	.49 729	.99 979	0 **12**	**58** 0	.53 552	.53 578	.99 974	0 **2**
10	775	796	979	50	10	614	639	974	50
20	842	863	978	40	20	675	700	974	40
30	908	930	978	30	30	736	762	974	30
40	975	997	978	20	40	797	823	974	20
50	50 042	50 063	978	10	50	858	884	974	10
49 0	.50 108	.50 130	.99 978	0 **11**	**59** 0	.53 919	.53 945	.99 974	0 **1**
10	174	196	978	50	10	979	54 005	974	50
20	241	263	978	40	20	54 040	066	974	40
30	307	329	978	30	30	101	127	974	30
40	373	395	978	20	40	161	187	974	20
50	439	461	978	10	50	222	248	974	10
50 0	.50 504	.50 527	.99 978	0 **10**	**60** 0	.54 282	.54 308	.99 974	0 **0**
	8–10	8–10	9–10			8–10	8–10	9–10	
′ ″	log cos	log cot	log sin	″ ′	′ ″	log cos	log cot	log sin	″ ′

0′–20′
6.68 55
6.68 55
1.99 99
89° 40′
–90°

20′–60′
3.76 47
3.76 47
1.99 99
89°–
89° 40′

1°–1° 40′
2.24 18
2.24 19
1.99 98
88° 20′
–89°

1° 40′–2°
2.46 36
2.46 38
1.99 97
88°–
88° 20′

TABLE V

NUMERICAL VALUES

OF THE

TRIGONOMETRIC FUNCTIONS OF ANGLES

From 0° to 90°

FOR EVERY MINUTE

TO FOUR PLACES OF DECIMALS

sin, cos 0°–9° .0000 .9848 80°–89°

′	0°		1°		2°		3°		4°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.0000	1.000	.0175	.9998	.0349	.9994	.0523	.9986	.0698	.9976	60
1	03	.000	77	98	52	94	26	86	0700	75	59
2	06	.000	80	98	55	94	29	86	03	75	58
3	09	.000	83	98	58	94	32	86	06	75	57
4	12	.000	86	98	61	93	35	86	09	75	56
5	.0015	1.000	.0189	.9998	.0364	.9993	.0538	.9986	.0712	.9975	55
6	17	.000	92	98	66	93	41	85	15	74	54
7	20	.000	95	98	69	93	44	85	18	74	53
8	23	.000	98	98	72	93	47	85	21	74	52
9	26	.000	0201	98	75	93	50	85	24	74	51
10	.0029	1.000	.0204	.9998	.0378	.9993	.0552	.9985	.0727	.9974	50
11	32	.000	07	98	81	93	55	85	29	73	49
12	35	.000	09	98	84	93	58	84	32	73	48
13	38	.000	12	98	87	93	61	84	35	73	47
14	41	.000	15	98	90	92	64	84	38	73	46
15	.0044	1.000	.0218	.9998	.0393	.9992	.0567	.9984	.0741	.9973	45
16	47	.000	21	98	96	92	70	84	44	72	44
17	49	.000	24	97	98	92	73	84	47	72	43
18	52	.000	27	97	0401	92	76	83	50	72	42
19	55	.000	30	97	04	92	79	83	53	72	41
20	.0058	1.000	.0233	.9997	.0407	.9992	.0581	.9983	.0756	.9971	40
21	61	.000	36	97	10	92	84	83	58	71	39
22	64	.000	39	97	13	91	87	83	61	71	38
23	67	.000	41	97	16	91	90	83	64	71	37
24	70	.000	44	97	19	91	93	82	67	71	36
25	.0073	1.000	.0247	.9997	.0422	.9991	.0596	.9982	.0770	.9970	35
26	76	.000	50	97	25	91	99	82	73	70	34
27	79	.000	53	97	27	91	0602	82	76	70	33
28	81	.000	56	97	30	91	05	82	79	70	32
29	84	.000	59	97	33	91	08	82	82	69	31
30	.0087	1.000	.0262	.9997	.0436	.9990	.0610	.9981	.0785	.9969	30
31	90	.000	65	96	39	90	13	81	87	69	29
32	93	.000	68	96	42	90	16	81	90	69	28
33	96	.000	70	96	45	90	19	81	93	68	27
34	99	.000	73	96	48	90	22	81	96	68	26
35	.0102	.9999	.0276	.9996	.0451	.9990	.0625	.9980	.0799	.9968	25
36	05	99	79	96	54	90	28	80	0802	68	24
37	08	99	82	96	57	90	31	80	05	68	23
38	11	99	85	96	59	89	34	80	08	67	22
39	13	99	88	96	62	89	37	80	11	67	21
40	.0116	.9999	.0291	.9996	.0465	.9989	.0640	.9980	.0814	.9967	20
41	19	99	94	96	68	89	42	79	16	67	19
42	22	99	97	96	71	89	45	79	19	66	18
43	25	99	0300	96	74	89	48	79	22	66	17
44	28	99	02	95	77	89	51	79	25	66	16
45	.0131	.9999	.0305	.9995	.0480	.9988	.0654	.9979	.0828	.9966	15
46	34	99	08	95	83	88	57	78	31	65	14
47	37	99	11	95	86	88	60	78	34	65	13
48	40	99	14	95	88	88	63	78	37	65	12
49	43	99	17	95	91	88	66	78	40	65	11
50	.0145	.9999	.0320	.9995	.0494	.9988	.0669	.9978	.0843	.9964	10
51	48	99	23	95	97	88	71	77	45	64	9
52	51	99	26	95	0500	87	74	77	48	64	8
53	54	99	29	95	03	87	77	77	51	64	7
54	57	99	32	95	06	87	80	77	54	63	6
55	.0160	.9999	.0334	.9994	.0509	.9987	.0683	.9977	.0857	.9963	5
56	63	99	37	94	12	87	86	76	60	63	4
57	66	99	40	94	15	87	89	76	63	63	3
58	69	99	43	94	18	87	92	76	66	62	2
59	72	99	46	94	20	86	95	76	69	62	1
60	.0175	.9998	.0349	.9994	.0523	.9986	.0698	.9976	.0872	.9962	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	89°		88°		87°		86°		85°		′

′	5°		6°		7°		8°		9°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.0872	.9962	.1045	.9945	.1219	.9925	.1392	.9903	.1564	.9877	60
1	74	62	48	45	22	25	95	02	67	76	59
2	77	61	51	45	24	25	97	02	70	76	58
3	80	61	54	44	27	24	1400	01	73	76	57
4	83	61	57	44	30	24	03	01	76	75	56
5	.0886	.9961	.1060	.9944	.1233	.9924	.1406	.9901	.1579	.9875	55
6	89	60	63	43	36	23	09	00	82	74	54
7	92	60	66	43	39	23	12	00	84	74	53
8	95	60	68	43	42	23	15	9899	87	73	52
9	98	60	71	42	45	22	18	99	90	73	51
10	.0901	.9959	.1074	.9942	.1248	.9922	.1421	.9899	.1593	.9872	50
11	03	59	77	42	50	22	23	98	96	72	49
12	06	59	80	42	53	21	26	98	99	71	48
13	09	59	83	41	56	21	29	97	1602	71	47
14	12	58	86	41	59	20	32	97	05	70	46
15	.0915	.9958	.1089	.9941	.1262	.9920	.1435	.9897	.1607	.9870	45
16	18	58	92	40	65	20	38	96	10	69	44
17	21	58	94	40	68	19	41	96	13	69	43
18	24	57	97	40	71	19	44	95	16	69	42
19	27	57	1100	39	74	19	46	95	19	68	41
20	.0929	.9957	.1103	.9939	.1276	.9918	.1449	.9894	.1622	.9868	40
21	32	56	06	39	79	18	52	94	25	67	39
22	35	56	09	38	82	17	55	94	28	67	38
23	38	56	12	38	85	17	58	93	30	66	37
24	41	56	15	38	88	17	61	93	33	66	36
25	.0944	.9955	.1118	.9937	.1291	.9916	.1464	.9892	.1636	.9865	35
26	47	55	20	37	94	16	67	92	39	65	34
27	50	55	23	37	97	16	69	91	42	64	33
28	53	55	26	36	99	15	72	91	45	64	32
29	56	54	29	36	1302	15	75	91	48	63	31
30	.0958	.9954	.1132	.9936	.1305	.9914	.1478	.9890	.1650	.9863	30
31	61	54	35	35	08	14	81	90	53	62	29
32	64	53	38	35	11	14	84	89	56	62	28
33	67	53	41	35	14	13	87	89	59	61	27
34	70	53	44	34	17	13	90	88	62	61	26
35	.0973	.9953	.1146	.9934	.1320	.9913	.1492	.9888	.1665	.9860	25
36	76	52	49	34	23	12	95	88	68	60	24
37	79	52	52	33	25	12	98	87	71	59	23
38	82	52	55	33	28	11	1501	87	73	59	22
39	85	51	58	33	31	11	04	86	76	59	21
40	.0987	.9951	.1161	.9932	.1334	.9911	.1507	.9886	.1679	.9858	20
41	90	51	64	32	37	10	10	85	82	58	19
42	93	51	67	32	40	10	13	85	85	57	18
43	96	50	70	31	43	09	15	84	88	57	17
44	99	50	72	31	46	09	18	84	91	56	16
45	.1002	.9950	.1175	.9931	.1349	.9909	.1521	.9884	.1693	.9856	15
46	05	49	78	30	51	08	24	83	96	55	14
47	08	49	81	30	54	08	27	83	99	55	13
48	11	49	84	30	57	07	30	82	1702	54	12
49	13	49	87	29	60	07	33	82	05	54	11
50	.1016	.9948	.1190	.9929	.1363	.9907	.1536	.9881	.1708	.9853	10
51	19	48	93	29	66	06	38	81	11	53	9
52	22	48	96	28	69	06	41	80	14	52	8
53	25	47	98	28	72	05	44	80	16	52	7
54	28	47	1201	28	74	05	47	80	19	51	6
55	.1031	.9947	.1204	.9927	.1377	.9905	.1550	.9879	.1722	.9851	5
56	34	46	07	27	80	04	53	79	25	50	4
57	37	46	10	27	83	04	56	78	28	50	3
58	39	46	13	26	86	03	59	78	31	49	2
59	42	46	16	26	89	03	61	77	34	49	1
60	.1045	.9945	.1219	.9925	.1392	.9903	.1564	.9877	.1736	.9848	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	84°		83°		82°		81°		80°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

70°–79°

′	10°		11°		12°		13°		14°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.1736	.9848	.1908	.9816	.2079	.9781	.2250	.9744	.2419	.9703	60
1	39	48	11	16	82	81	52	43	22	02	59
2	42	47	14	15	85	80	55	42	25	02	58
3	45	47	17	15	88	80	58	42	28	01	57
4	48	46	20	14	90	79	61	41	31	00	56
5	.1751	.9846	.1922	.9813	.2093	.9778	.2264	.9740	.2433	.9699	55
6	54	45	25	13	96	78	67	40	36	99	54
7	57	45	28	12	99	77	69	39	39	98	53
8	59	44	31	12	2102	77	72	38	42	97	52
9	62	43	34	11	05	76	75	38	45	97	51
10	.1765	.9843	.1937	.9811	.2108	.9775	.2278	.9737	.2447	.9696	50
11	68	42	39	10	10	75	81	36	50	95	49
12	71	42	42	10	13	74	84	36	53	94	48
13	74	41	45	09	16	74	86	35	56	94	47
14	77	41	48	08	19	73	89	34	59	93	46
15	.1779	.9840	.1951	.9808	.2122	.9772	.2292	.9734	.2462	.9692	45
16	82	40	54	07	25	72	95	33	64	92	44
17	85	39	57	07	27	71	98	32	67	91	43
18	88	39	59	06	30	70	2300	32	70	90	42
19	91	38	62	06	33	70	03	31	73	89	41
20	.1794	.9838	.1965	.9805	.2136	.9769	.2306	.9730	.2476	.9689	40
21	97	37	68	04	39	69	09	30	78	88	39
22	99	37	71	04	42	68	12	29	81	87	38
23	1802	36	74	03	45	67	15	28	84	87	37
24	05	36	77	03	47	67	17	28	87	86	36
25	.1808	.9835	.1979	.9802	.2150	.9766	.2320	.9727	.2490	.9685	35
26	11	35	82	02	53	65	23	26	93	84	34
27	14	34	85	01	56	65	26	26	95	84	33
28	17	34	88	00	59	64	29	25	98	83	32
29	19	33	91	00	62	64	32	24	2501	82	31
30	.1822	.9833	.1994	.9799	.2164	.9763	.2334	.9724	.2504	.9681	30
31	25	32	97	99	67	62	37	23	07	81	29
32	28	31	99	98	70	62	40	22	09	80	28
33	31	31	2002	98	73	61	43	22	12	79	27
34	34	30	05	97	76	60	46	21	15	79	26
35	.1837	.9830	.2008	.9796	.2179	.9760	.2349	.9720	.2518	.9678	25
36	40	29	11	96	81	59	51	20	21	77	24
37	42	29	14	95	84	59	54	19	24	76	23
38	45	28	16	95	87	58	57	18	26	76	22
39	48	28	19	94	90	57	60	18	29	75	21
40	.1851	.9827	.2022	.9793	.2193	.9757	.2363	.9717	.2532	.9674	20
41	54	27	25	93	96	56	66	16	35	73	19
42	57	26	28	92	98	55	68	15	38	73	18
43	60	26	31	92	2201	55	71	15	40	72	17
44	62	25	34	91	04	54	74	14	43	71	16
45	.1865	.9825	.2036	.9790	.2207	.9753	.2377	.9713	.2546	.9670	15
46	68	24	39	90	10	53	80	13	49	70	14
47	71	23	42	89	13	52	83	12	52	69	13
48	74	23	45	89	15	51	85	11	54	68	12
49	77	22	48	88	18	51	88	11	57	67	11
50	.1880	.9822	.2051	.9787	.2221	.9750	.2391	.9710	.2560	.9667	10
51	82	21	54	87	24	50	94	09	63	66	9
52	85	21	56	86	27	49	97	09	66	65	8
53	88	20	59	86	30	48	99	08	69	65	7
54	91	20	62	85	33	48	2402	07	71	64	6
55	.1894	.9819	.2065	.9784	.2235	.9747	.2405	.9706	.2574	.9663	5
56	97	18	68	84	38	46	08	06	77	62	4
57	1900	18	71	83	41	46	11	05	80	62	3
58	02	17	73	83	44	45	14	04	83	61	2
59	05	17	76	82	47	44	16	04	85	60	1
60	.1908	.9816	.2079	.9781	.2250	.9744	.2419	.9703	.2588	.9659	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	79°		78°		77°		76°		75°		′

′	15°		16°		17°		18°		19°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.2588	.9659	.2756	.9613	.2924	.9563	.3090	.9511	.3256	.9455	60
1	91	59	59	12	26	62	93	10	58	54	59
2	94	58	62	11	29	61	96	09	61	53	58
3	97	57	65	10	32	60	98	08	64	52	57
4	99	56	68	09	35	60	3101	07	67	51	56
5	.2602	.9655	.2770	.9609	.2938	.9559	.3104	.9506	.3269	.9450	55
6	05	55	73	08	40	58	07	05	72	49	54
7	08	54	76	07	43	57	10	04	75	49	53
8	11	53	79	06	46	56	12	03	78	48	52
9	13	52	82	05	49	55	15	02	80	47	51
10	.2616	.9652	.2784	.9605	.2952	.9555	.3118	.9502	.3283	.9446	50
11	19	51	87	04	54	54	21	01	86	45	49
12	22	50	90	03	57	53	23	9500	89	44	48
13	25	49	93	02	60	52	26	9499	91	43	47
14	28	49	95	01	63	51	29	98	94	42	46
15	.2630	.9648	.2798	.9600	.2965	.9550	.3132	.9497	.3297	.9441	45
16	33	47	2801	00	68	49	34	96	3300	40	44
17	36	46	04	9599	71	48	37	95	02	39	43
18	39	46	07	98	74	48	40	94	05	38	42
19	42	45	09	97	77	47	43	93	08	37	41
20	.2644	.9644	.2812	.9596	.2979	.9546	.3145	.9492	.3311	.9436	40
21	47	43	15	96	82	45	48	92	13	35	39
22	50	42	18	95	85	44	51	91	16	34	38
23	53	42	21	94	88	43	54	90	19	33	37
24	56	41	23	93	90	42	56	89	22	32	36
25	.2658	.9640	.2826	.9592	.2993	.9542	.3159	.9488	.3324	.9431	35
26	61	39	29	91	96	41	62	87	27	30	34
27	64	39	32	91	99	40	65	86	30	29	33
28	67	38	35	90	3002	39	68	85	33	28	32
29	70	37	37	89	04	38	70	84	35	27	31
30	.2672	.9636	.2840	.9588	.3007	.9537	.3173	.9483	.3338	.9426	30
31	75	36	43	87	10	36	76	82	41	25	29
32	78	35	46	87	13	35	79	81	44	24	28
33	81	34	49	86	15	35	81	80	46	23	27
34	84	33	51	85	18	34	84	80	49	23	26
35	.2686	.9632	.2854	.9584	.3021	.9533	.3187	.9479	.3352	.9422	25
36	89	32	57	83	24	32	90	78	55	21	24
37	92	31	60	82	26	31	92	77	57	20	23
38	95	30	62	82	29	30	95	76	60	19	22
39	98	29	65	81	32	29	98	75	63	18	21
40	.2700	.9628	.2868	.9580	.3035	.9528	.3201	.9474	.3365	.9417	20
41	03	28	71	79	38	27	03	73	68	16	19
42	06	27	74	78	40	27	06	72	71	15	18
43	09	26	76	77	43	26	09	71	74	14	17
44	12	25	79	77	46	25	12	70	76	13	16
45	.2714	.9625	.2882	.9576	.3049	.9524	.3214	.9469	.3379	.9412	15
46	17	24	85	75	51	23	17	68	82	11	14
47	20	23	88	74	54	22	20	67	85	10	13
48	23	22	90	73	57	21	23	66	87	09	12
49	26	21	93	72	60	20	25	66	90	08	11
50	.2728	.9621	.2896	.9572	.3062	.9520	.3228	.9465	.3393	.9407	10
51	31	20	99	71	65	19	31	64	96	06	9
52	34	19	2901	70	68	18	34	63	98	05	8
53	37	18	04	69	71	17	36	62	3401	04	7
54	40	17	07	68	74	16	39	61	04	03	6
55	.2742	.9617	.2910	.9567	.3076	.9515	.3242	.9460	.3407	.9402	5
56	45	16	13	66	79	14	45	59	09	01	4
57	48	15	15	66	82	13	47	58	12	00	3
58	51	14	18	65	85	12	50	57	15	9399	2
59	54	13	21	64	87	11	53	56	17	98	1
60	.2756	.9613	.2924	.9563	.3090	.9511	.3256	.9455	.3420	.9397	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	74°		73°		72°		71°		70°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

sin, cos 20°–29° .3420 .8660

sin, cos 60°–69°

′	20°		21°		22°		23°		24°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.3420	.9397	.3584	.9336	.3746	.9272	.3907	.9205	.4067	.9135	60
1	23	96	86	35	49	71	10	04	70	34	59
2	26	95	89	34	51	70	13	03	73	33	58
3	28	94	92	33	54	69	15	02	75	32	57
4	31	93	95	32	57	67	18	00	78	31	56
5	.3434	.9392	.3597	.9331	.3760	.9266	.3921	.9199	.4081	.9130	55
6	37	91	3600	30	62	65	23	98	83	28	54
7	39	90	03	28	65	64	26	97	86	27	53
8	42	89	05	27	68	63	29	96	89	26	52
9	45	88	08	26	70	62	31	95	91	25	51
10	.3448	.9387	.3611	.9325	.3773	.9261	.3934	.9194	.4094	.9124	50
11	50	86	14	24	76	60	37	92	97	22	49
12	53	85	16	23	78	59	39	91	99	21	48
13	56	84	19	22	81	58	42	90	4102	20	47
14	58	83	22	21	84	57	45	89	05	19	46
15	.3461	.9382	.3624	.9320	.3786	.9255	.3947	.9188	.4107	.9118	45
16	64	81	27	19	89	54	50	87	10	16	44
17	67	80	30	18	92	53	53	86	12	15	43
18	69	79	33	17	95	52	55	84	15	14	42
19	72	78	35	16	97	51	58	83	18	13	41
20	.3475	.9377	.3638	.9315	.3800	.9250	.3961	.9182	.4120	.9112	40
21	78	76	41	14	03	49	63	81	23	10	39
22	80	75	43	13	05	48	66	80	26	09	38
23	83	74	46	12	08	47	69	79	28	08	37
24	86	73	49	11	11	45	71	78	31	07	36
25	.3488	.9372	.3651	.9309	.3813	.9244	.3974	.9176	.4134	.9106	35
26	91	71	54	08	16	43	77	75	36	04	34
27	94	70	57	07	19	42	79	74	39	03	33
28	97	69	60	06	21	41	82	73	42	02	32
29	99	68	62	05	24	40	85	72	44	01	31
30	.3502	.9367	.3665	.9304	.3827	.9239	.3987	.9171	.4147	.9100	30
31	05	66	68	03	30	38	90	69	50	9098	29
32	08	65	70	02	32	37	93	68	52	97	28
33	10	64	73	01	35	35	95	67	55	96	27
34	13	63	76	00	38	34	98	66	58	95	26
35	.3516	.9362	.3679	.9299	.3840	.9233	.4001	.9165	.4160	.9094	25
36	18	61	81	98	43	32	03	64	63	92	24
37	21	60	84	97	46	31	06	62	65	91	23
38	24	59	87	96	48	30	09	61	68	90	22
39	27	58	89	95	51	29	11	60	71	89	21
40	.3529	.9356	.3692	.9293	.3854	.9228	.4014	.9159	.4173	.9088	20
41	32	55	95	92	56	27	17	58	76	86	19
42	35	54	97	91	59	25	19	57	79	85	18
43	37	53	3700	90	62	24	22	55	81	84	17
44	40	52	03	89	64	23	25	54	84	83	16
45	.3543	.9351	.3706	.9288	.3867	.9222	.4027	.9153	.4187	.9081	15
46	46	50	08	87	70	21	30	52	89	80	14
47	48	49	11	86	72	20	33	51	92	79	13
48	51	48	14	85	75	19	35	50	95	78	12
49	54	47	16	84	78	18	38	48	97	77	11
50	.3557	.9346	.3719	.9283	.3881	.9216	.4041	.9147	.4200	.9075	10
51	59	45	22	82	83	15	43	46	02	74	9
52	62	44	24	81	86	14	46	45	05	73	8
53	65	43	27	79	89	13	49	44	08	72	7
54	67	42	30	78	91	12	51	43	10	70	6
55	.3570	.9341	.3733	.9277	.3894	.9211	.4054	.9141	.4213	.9069	5
56	73	40	35	76	97	10	57	40	16	68	4
57	76	39	38	75	99	08	59	39	18	67	3
58	78	38	41	74	3902	07	62	38	21	66	2
59	81	37	43	73	05	06	65	37	24	64	1
60	.3584	.9336	.3746	.9272	.3907	.9205	.4067	.9135	.4226	.9063	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	69°		68°		67°		66°		65°		′

′	25°		26°		27°		28°		29°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.4226	.9063	.4384	.8988	.4540	.8910	.4695	.8829	.4848	.8746	60
1	29	62	86	87	42	09	97	28	51	45	59
2	31	61	89	85	45	07	4700	27	53	43	58
3	34	59	92	84	48	06	02	25	56	42	57
4	37	58	94	83	50	05	05	24	58	41	56
5	.4239	.9057	.4397	.8982	.4553	.8903	.4708	.8823	.4861	.8739	55
6	42	56	99	80	55	02	10	21	63	38	54
7	45	54	4402	79	58	01	13	20	66	36	53
8	47	53	05	78	61	8899	15	19	68	35	52
9	50	52	07	76	63	98	18	17	71	33	51
10	.4253	.9051	.4410	.8975	.4566	.8897	.4720	.8816	.4874	.8732	50
11	55	50	12	74	68	95	23	14	76	31	49
12	58	48	15	73	71	94	26	13	79	29	48
13	60	47	18	71	74	93	28	12	81	28	47
14	63	46	20	70	76	92	31	10	84	26	46
15	.4266	.9045	.4423	.8969	.4579	.8890	.4733	.8809	.4886	.8725	45
16	68	43	25	67	81	89	36	08	89	24	44
17	71	42	28	66	84	88	38	06	91	22	43
18	74	41	31	65	86	86	41	05	94	21	42
19	76	40	33	64	89	85	43	03	96	19	41
20	.4279	.9038	.4436	.8962	.4592	.8884	.4746	.8802	.4899	.8718	40
21	81	37	39	61	94	82	49	01	4901	16	39
22	84	36	41	60	97	81	51	8799	04	15	38
23	87	35	44	58	99	79	54	98	07	14	37
24	89	33	46	57	4602	78	56	96	09	12	36
25	.4292	.9032	.4449	.8956	.4605	.8877	.4759	.8795	.4912	.8711	35
26	95	31	52	55	07	75	61	94	14	09	34
27	97	30	54	53	10	74	64	92	17	08	33
28	4300	28	57	52	12	73	66	91	19	06	32
29	02	27	59	51	15	71	69	90	22	05	31
30	.4305	.9026	.4462	.8949	.4617	.8870	.4772	.8788	.4924	.8704	30
31	08	25	65	48	20	69	74	87	27	02	29
32	10	23	67	47	23	67	77	85	29	01	28
33	13	22	70	45	25	66	79	84	32	8699	27
34	16	21	72	44	28	65	82	83	34	98	26
35	.4318	.9020	.4475	.8943	.4630	.8863	.4784	.8781	.4937	.8696	25
36	21	18	78	42	33	62	87	80	39	95	24
37	23	17	80	40	36	61	89	78	42	94	23
38	26	16	83	39	38	59	92	77	44	92	22
39	29	15	85	38	41	58	95	76	47	91	21
40	.4331	.9013	.4488	.8936	.4643	.8857	.4797	.8774	.4950	.8689	20
41	34	12	91	35	46	55	4800	73	52	88	19
42	37	11	93	34	48	54	02	71	55	86	18
43	39	10	96	32	51	53	05	70	57	85	17
44	42	08	98	31	54	51	07	69	60	83	16
45	.4344	.9007	.4501	.8930	.4656	.8850	.4810	.8767	.4962	.8682	15
46	47	06	04	28	59	49	12	66	65	81	14
47	50	04	06	27	61	47	15	64	67	79	13
48	52	03	09	26	64	46	18	63	70	78	12
49	55	02	11	25	66	44	20	62	72	76	11
50	.4358	.9001	.4514	.8923	.4669	.8843	.4823	.8760	.4975	.8675	10
51	60	8999	17	22	72	42	25	59	77	73	9
52	63	98	19	21	74	40	28	57	80	72	8
53	65	97	22	19	77	39	30	56	82	70	7
54	68	96	24	18	79	38	33	55	85	69	6
55	.4371	.8994	.4527	.8917	.4682	.8836	.4835	.8753	.4987	.8668	5
56	73	93	30	15	84	35	38	52	90	66	4
57	76	92	32	14	87	34	40	50	92	65	3
58	78	90	35	13	90	32	43	49	95	63	2
59	81	89	37	11	92	31	46	48	97	62	1
60	.4384	.8988	.4540	.8910	.4695	.8829	.4848	.8746	.5000	.8660	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	64°		63°		62°		61°		60°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

sin, cos 20°–29° .3420 .8660

sin, cos 30°–39° .5000 .7660

50°–59°

′	30°		31°		32°		33°		34°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.5000	.8660	.5150	.8572	.5299	.8480	.5446	.8387	.5592	.8290	60
1	03	59	53	70	5302	79	49	85	94	89	59
2	05	57	55	69	04	77	51	84	97	87	58
3	08	56	58	67	07	76	54	82	99	85	57
4	10	54	60	66	09	74	56	80	5602	84	56
5	.5013	.8653	.5163	.8564	.5312	.8473	.5459	.8379	.5604	.8282	55
6	15	52	65	63	14	71	61	77	06	81	54
7	18	50	68	61	16	70	63	76	09	79	53
8	20	49	70	60	19	68	66	74	11	77	52
9	23	47	73	58	21	67	68	72	14	76	51
10	.5025	.8646	.5175	.8557	.5324	.8465	.5471	.8371	.5616	.8274	50
11	28	44	78	55	26	63	73	69	18	72	49
12	30	43	80	54	29	62	76	68	21	71	48
13	33	41	83	52	31	60	78	66	23	69	47
14	35	40	85	51	34	59	80	64	26	68	46
15	.5038	.8638	.5188	.8549	.5336	.8457	.5483	.8363	.5628	.8266	45
16	40	37	90	48	39	56	85	61	30	64	44
17	43	35	93	46	41	54	88	60	33	63	43
18	45	34	95	45	44	53	90	58	35	61	42
19	48	32	98	43	46	51	93	56	38	59	41
20	.5050	.8631	.5200	.8542	.5348	.8450	.5495	.8355	.5640	.8258	40
21	53	30	03	40	51	48	98	53	42	56	39
22	55	28	05	39	53	46	5500	52	45	54	38
23	58	27	08	37	56	45	02	50	47	53	37
24	60	25	10	36	58	43	05	48	50	51	36
25	.5063	.8624	.5213	.8534	.5361	.8442	.5507	.8347	.5652	.8249	35
26	65	22	15	32	63	40	10	45	54	48	34
27	68	21	18	31	66	39	12	44	57	46	33
28	70	19	20	29	68	37	15	42	59	45	32
29	73	18	23	28	71	35	17	40	62	43	31
30	.5075	.8616	.5225	.8526	.5373	.8434	.5519	.8339	.5664	.8241	30
31	78	15	27	25	75	32	22	37	66	40	29
32	80	13	30	23	78	31	24	36	69	38	28
33	83	12	32	22	80	29	27	34	71	36	27
34	85	10	35	20	83	28	29	32	74	35	26
35	.5088	.8609	.5237	.8519	.5385	.8426	.5531	.8331	.5676	.8233	25
36	90	07	40	17	88	25	34	29	78	31	24
37	93	06	42	16	90	23	36	28	81	30	23
38	95	04	45	14	93	21	39	26	83	28	22
39	98	03	47	13	95	20	41	24	86	26	21
40	.5100	.8601	.5250	.8511	.5398	.8418	.5544	.8323	.5688	.8225	20
41	03	00	52	10	5400	17	46	21	90	23	19
42	05	8599	55	08	02	15	48	20	93	21	18
43	08	97	57	07	05	14	51	18	95	20	17
44	10	96	60	05	07	12	53	16	98	18	16
45	.5113	.8594	.5262	.8504	.5410	.8410	.5556	.8315	.5700	.8216	15
46	15	93	65	02	12	09	58	13	02	15	14
47	18	91	67	00	15	07	61	11	05	13	13
48	20	90	70	8499	17	06	63	10	07	11	12
49	23	88	72	97	20	04	65	08	10	10	11
50	.5125	.8587	.5275	.8496	.5422	.8403	.5568	.8307	.5712	.8208	10
51	28	85	77	94	24	01	70	05	14	07	9
52	30	84	79	93	27	8399	73	03	17	05	8
53	33	82	82	91	29	98	75	02	19	03	7
54	35	81	84	90	32	96	77	00	21	02	6
55	.5138	.8579	.5287	.8488	.5434	.8395	.5580	.8298	.5724	.8200	5
56	40	78	89	87	37	93	82	97	26	8198	4
57	43	76	92	85	39	91	85	95	29	97	3
58	45	75	94	84	42	90	87	94	31	95	2
59	48	73	97	82	44	88	90	92	33	93	1
60	.5150	.8572	.5299	.8480	.5446	.8387	.5592	.8290	.5736	.8192	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	59°		58°		57°		56°		55°		′

′	35°		36°		37°		38°		39°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.5736	.8192	.5878	.8090	.6018	.7986	.6157	.7880	.6293	.7771	60
1	38	90	80	88	20	85	59	78	95	70	59
2	41	88	83	87	23	83	61	77	98	68	58
3	43	87	85	85	25	81	63	75	6300	66	57
4	45	85	87	83	27	79	66	73	02	64	56
5	.5748	.8183	.5890	.8082	.6030	.7978	.6168	.7871	.6305	.7762	55
6	50	81	92	80	32	76	70	69	07	60	54
7	52	80	94	78	34	74	73	68	09	59	53
8	55	78	97	76	37	72	75	66	11	57	52
9	57	76	99	75	39	71	77	64	14	55	51
10	.5760	.8175	.5901	.8073	.6041	.7969	.6180	.7862	.6316	.7753	50
11	62	73	04	71	44	67	82	60	18	51	49
12	64	71	06	70	46	65	84	59	20	49	48
13	67	70	08	68	48	64	86	57	23	48	47
14	69	68	11	66	51	62	89	55	25	46	46
15	.5771	.8166	.5913	.8064	.6053	.7960	.6191	.7853	.6327	.7744	45
16	74	65	15	63	55	58	93	51	29	42	44
17	76	63	18	61	58	56	96	50	32	40	43
18	79	61	20	59	60	55	98	48	34	38	42
19	81	60	22	58	62	53	6200	46	36	37	41
20	.5783	.8158	.5925	.8056	.6065	.7951	.6202	.7844	.6338	.7735	40
21	86	56	27	54	67	49	05	42	41	33	39
22	88	55	30	52	69	48	07	41	43	31	38
23	90	53	32	51	71	46	09	39	45	29	37
24	93	51	34	49	74	44	11	37	47	27	36
25	.5795	.8150	.5937	.8047	.6076	.7942	.6214	.7835	.6350	.7725	35
26	98	48	39	45	78	41	16	33	52	24	34
27	5800	46	41	44	81	39	18	32	54	22	33
28	02	45	44	42	83	37	21	30	56	20	32
29	05	43	46	40	85	35	23	28	59	18	31
30	.5807	.8141	.5948	.8039	.6088	.7934	.6225	.7826	.6361	.7716	30
31	09	39	51	37	90	32	27	24	63	14	29
32	12	38	53	35	92	30	30	22	65	13	28
33	14	36	55	33	95	28	32	21	68	11	27
34	16	34	58	32	97	26	34	19	70	09	26
35	.5819	.8133	.5960	.8030	.6099	.7925	.6237	.7817	.6372	.7707	25
36	21	31	62	28	6101	23	39	15	74	05	24
37	24	29	65	26	04	21	41	13	76	03	23
38	26	28	67	25	06	19	43	12	79	01	22
39	28	26	69	23	08	18	46	10	81	00	21
40	.5831	.8124	.5972	.8021	.6111	.7916	.6248	.7808	.6383	.7698	20
41	33	23	74	19	13	14	50	06	85	96	19
42	35	21	76	18	15	12	52	04	88	94	18
43	38	19	79	16	18	10	55	02	90	92	17
44	40	17	81	14	20	09	57	01	92	90	16
45	.5842	.8116	.5983	.8013	.6122	.7907	.6259	.7799	.6394	.7688	15
46	45	14	86	11	24	05	62	97	97	87	14
47	47	12	88	09	27	03	64	95	99	85	13
48	50	11	90	07	29	02	66	93	6401	83	12
49	52	09	93	06	31	00	68	92	03	81	11
50	.5854	.8107	.5995	.8004	.6134	.7898	.6271	.7790	.6406	.7679	10
51	57	06	97	02	36	96	73	88	08	77	9
52	59	04	6000	00	38	94	75	86	10	75	8
53	61	02	02	7999	41	93	77	84	12	74	7
54	64	00	04	97	43	91	80	82	14	72	6
55	.5866	.8099	.6007	.7995	.6145	.7889	.6282	.7781	.6417	.7670	5
56	68	97	09	93	47	87	84	79	19	68	4
57	71	95	11	92	50	85	86	77	21	66	3
58	73	94	14	90	52	84	89	75	23	64	2
59	75	92	16	88	54	82	91	73	26	62	1
60	.5878	.8090	.6018	.7986	.6157	.7880	.6293	.7771	.6428	.7660	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	54°		53°		52°		51°		50°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

sin, cos 20°–29° .3420 .8660

sin, cos 30°–39° .5000 .7660

sin, cos 40°–44° .6428 .7071

tan, cot 0°–4° .0000 11.43

tan, cot 85°–89°

′	40°		41°		42°		43°		44°		′
	sin	cos	sin	cos	sin	cos	sin	cos	sin	cos	
0	.6428	.7660	.6561	.7547	.6691	.7431	.6820	.7314	.6947	.7193	60
1	30	59	63	45	93	30	22	12	49	91	59
2	32	57	65	43	96	28	24	10	51	89	58
3	35	55	67	41	98	26	26	08	53	87	57
4	37	53	69	39	6700	24	28	06	55	85	56
5	.6439	.7651	.6572	.7538	.6702	.7422	.6831	.7304	.6957	.7183	55
6	41	49	74	36	04	20	33	02	59	81	54
7	43	47	76	34	06	18	35	00	61	79	53
8	46	45	78	32	09	16	37	7298	63	77	52
9	48	44	80	30	11	14	39	96	65	75	51
10	.6450	.7642	.6583	.7528	.6713	.7412	.6841	.7294	.6967	.7173	50
11	52	40	85	26	15	10	43	92	70	71	49
12	55	38	87	24	17	08	45	90	72	69	48
13	57	36	89	22	19	06	48	88	74	67	47
14	59	34	91	20	22	04	50	86	76	65	46
15	.6461	.7632	.6593	.7518	.6724	.7402	.6852	.7284	.6978	.7163	45
16	63	30	96	16	26	00	54	82	80	61	44
17	66	29	98	15	28	7398	56	80	82	59	43
18	68	27	6600	13	30	96	58	78	84	57	42
19	70	25	02	11	32	94	60	76	86	55	41
20	.6472	.7623	.6604	.7509	.6734	.7392	.6862	.7274	.6988	.7153	40
21	75	21	07	07	37	90	65	72	90	51	39
22	77	19	09	05	39	88	67	70	92	49	38
23	79	17	11	03	41	87	69	68	95	47	37
24	81	15	13	01	43	85	71	66	97	45	36
25	.6483	.7613	.6615	.7499	.6745	.7383	.6873	.7264	.6999	.7143	35
26	86	12	17	97	47	81	75	62	7001	41	34
27	88	10	20	95	49	79	77	60	03	39	33
28	90	08	22	93	52	77	79	58	05	37	32
29	92	06	24	91	54	75	81	56	07	35	31
30	.6494	.7604	.6626	.7490	.6756	.7373	.6884	.7254	.7009	.7133	30
31	97	02	28	88	58	71	86	52	11	30	29
32	99	00	31	86	60	69	88	50	13	28	28
33	6501	7598	33	84	62	67	90	48	15	26	27
34	03	96	35	82	64	65	92	46	17	24	26
35	.6506	.7595	.6637	.7480	.6767	.7363	.6894	.7244	.7019	.7122	25
36	08	93	39	78	69	61	96	42	22	20	24
37	10	91	41	76	71	59	98	40	24	18	23
38	12	89	44	74	73	57	6900	38	26	16	22
39	14	87	46	72	75	55	03	36	28	14	21
40	.6517	.7585	.6648	.7470	.6777	.7353	.6905	.7234	.7030	.7112	20
41	19	83	50	68	79	51	07	32	32	10	19
42	21	81	52	66	82	49	09	30	34	08	18
43	23	79	54	64	84	47	11	28	36	06	17
44	25	78	57	63	86	45	13	26	38	04	16
45	.6528	.7576	.6659	.7461	.6788	.7343	.6915	.7224	.7040	.7102	15
46	30	74	61	59	90	41	17	22	42	00	14
47	32	72	63	57	92	39	19	20	44	7098	13
48	34	70	65	55	94	37	21	18	46	96	12
49	36	68	67	53	97	35	24	16	48	94	11
50	.6539	.7566	.6670	.7451	.6799	.7333	.6926	.7214	.7050	.7092	10
51	41	64	72	49	6801	31	28	12	53	90	9
52	43	62	74	47	03	29	30	10	55	88	8
53	45	60	76	45	05	27	32	08	57	85	7
54	47	59	78	43	07	25	34	06	59	83	6
55	.6550	.7557	.6680	.7441	.6809	.7323	.6936	.7203	.7061	.7081	5
56	52	55	83	39	11	21	38	01	63	79	4
57	54	53	85	37	14	19	40	7199	65	77	3
58	56	51	87	35	16	18	42	97	67	75	2
59	58	49	89	33	18	16	44	95	69	73	1
60	.6561	.7547	.6691	.7431	.6820	.7314	.6947	.7193	.7071	.7071	0
	cos	sin	cos	sin	cos	sin	cos	sin	cos	sin	
′	49°		48°		47°		46°		45°		′

′	0°		1°		2°		3°		4°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.0000	Infinite	.0175	57.2900	.0349	28.6363	.0524	19.0811	.0699	14.3007	60
1	03	3437.75	77	56.3506	52	3994	27	18.9755	0702	2411	59
2	06	1718.87	80	55.4415	55	1664	30	8711	05	1821	58
3	09	1145.92	83	54.5613	58	27.9372	33	7678	08	1235	57
4	12	859.436	86	53.7086	61	7117	36	6656	11	0655	56
5	.0015	687.549	.0189	52.8821	.0364	27.4899	.0539	18.5645	.0714	14.0079	55
6	17	572.957	92	0807	67	2715	42	4645	17	13.9507	54
7	20	491.106	95	51.3032	70	0566	44	3655	20	8940	53
8	23	429.718	98	50.5485	73	26.8450	47	2677	23	8378	52
9	26	381.971	0201	49.8157	75	6367	50	1708	26	7821	51
10	.0029	343.774	.0204	49.1039	.0378	26.4316	.0553	18.0750	.0729	13.7267	50
11	32	312.521	07	48.4121	81	2296	56	17.9802	31	6719	49
12	35	286.478	09	47.7395	84	0307	59	8863	34	6174	48
13	38	264.441	12	0853	87	25.8348	62	7934	37	5634	47
14	41	245.552	15	46.4489	90	6418	65	7015	40	5098	46
15	.0044	229.182	.0218	45.8294	.0393	25.4517	.0568	17.6106	.0743	13.4566	45
16	47	214.858	21	2261	96	2644	71	5205	46	4039	44
17	49	202.219	24	44.6386	99	0798	74	4314	49	3515	43
18	52	190.984	27	0661	0402	24.8978	77	3432	52	2996	42
19	55	180.932	30	43.5081	05	7185	80	2558	55	2480	41
20	.0058	171.885	.0233	42.9641	.0407	24.5418	.0582	17.1693	.0758	13.1969	40
21	61	163.700	36	4335	10	3675	85	0837	61	1461	39
22	64	156.259	39	41.9158	13	1957	88	16.9990	64	0958	38
23	67	149.465	41	4106	16	0263	91	9150	67	0458	37
24	70	143.237	44	40.9174	19	23.8593	94	8319	69	12.9962	36
25	.0073	137.507	.0247	40.4358	.0422	23.6945	.0597	16.7496	.0772	12.9469	35
26	76	132.219	50	39.9655	25	5321	0600	6681	75	8981	34
27	79	127.321	53	5059	28	3718	03	5874	78	8496	33
28	81	122.774	56	0568	31	2137	06	5075	81	8014	32
29	84	118.540	59	38.6177	34	0577	09	4283	84	7536	31
30	.0087	114.589	.0262	38.1885	.0437	22.9038	.0612	16.3499	.0787	12.7062	30
31	90	110.892	65	37.7686	40	7519	15	2722	90	6591	29
32	93	107.426	68	3579	42	6020	17	1952	93	6124	28
33	96	104.171	71	36.9560	45	4541	20	1190	96	5660	27
34	99	101.107	74	5627	48	3081	23	0435	99	5199	26
35	.0102	98.2179	.0276	36.1776	.0451	22.1640	.0626	15.9687	.0802	12.4742	25
36	05	95.4895	79	35.8006	54	0217	29	8945	05	4288	24
37	08	92.9085	82	4313	57	21.8813	32	8211	08	3838	23
38	11	90.4633	85	0695	60	7426	35	7483	10	3390	22
39	13	88.1436	88	34.7151	63	6056	38	6762	13	2946	21
40	.0116	85.9398	.0291	34.3678	.0466	21.4704	.0641	15.6048	.0816	12.2505	20
41	19	83.8435	94	0273	69	3369	44	5340	19	2067	19
42	22	81.8470	97	33.6935	72	2049	47	4638	22	1632	18
43	25	79.9434	0300	3662	75	0747	50	3943	25	1201	17
44	28	78.1263	03	0452	77	20.9460	53	3254	28	0772	16
45	.0131	76.3900	.0306	32.7303	.0480	20.8188	.0655	15.2571	.0831	12.0346	15
46	34	74.7292	08	4213	83	6932	58	1893	34	11.9923	14
47	37	73.1390	11	1181	86	5691	61	1222	37	9504	13
48	40	71.6151	14	31.8205	89	4465	64	0557	40	9087	12
49	43	70.1533	17	5284	92	3253	67	14.9898	43	8673	11
50	.0145	68.7501	.0320	31.2416	.0495	20.2056	.0670	14.9244	.0846	11.8262	10
51	48	67.4019	23	30.9599	98	0872	73	8596	49	7853	9
52	51	66.1055	26	6833	0501	19.9702	76	7954	51	7448	8
53	54	64.8580	29	4116	04	8546	79	7317	54	7045	7
54	57	63.6567	32	1446	07	7403	82	6685	57	6645	6
55	.0160	62.4992	.0335	29.8823	.0509	19.6273	.0685	14.6059	.0860	11.6248	5
56	63	61.3829	38	6245	12	5156	88	5438	63	5853	4
57	66	60.3058	40	3711	15	4051	90	4823	66	5461	3
58	69	59.2659	43	1220	18	2959	93	4212	69	5072	2
59	72	58.2612	46	28.8771	21	1879	96	3607	72	4685	1
60	.0175	57.2900	.0349	28.6363	.0524	19.0811	.0699	14.3007	.0875	11.4301	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	89°		88°		87°		86°		85°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

sin, cos 20°–29° .3420 .8660

sin, cos 30°–39° .5000 .7660

sin, cos 40°–44° .6428 .7071

45°–49°

tan, cot 0°–4° .0000 11.43

85°–89°

tan, cot 5°–14° .0875 3.732

75°–84°

′	5°		6°		7°		8°		9°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.0875	11.4301	.1051	9.5144	.1228	8.1443	.1405	7.1154	.1584	6.3138	60
1	78	3919	54	4878	31	1248	08	1004	87	3019	59
2	81	3540	57	4614	34	1054	11	0855	90	2901	58
3	84	3163	60	4352	37	0860	14	0706	93	2783	57
4	87	2789	63	4090	40	0667	17	0558	96	2666	56
5	.0890	11.2417	.1066	9.3831	.1243	8.0476	.1420	7.0410	.1599	6.2549	55
6	92	2048	69	3572	46	0285	23	0264	1602	2432	54
7	95	1681	72	3315	49	0095	26	0117	05	2316	53
8	98	1316	75	3060	51	7.9906	29	6.9972	08	2200	52
9	0901	0954	78	2806	54	9718	32	9827	11	2085	51
10	.0904	11.0594	.1080	9.2553	.1257	7.9530	.1435	6.9682	.1614	6.1970	50
11	07	0237	83	2302	60	9344	38	9538	17	1856	49
12	10	10.9882	86	2052	63	9158	41	9395	20	1742	48
13	13	9529	89	1803	66	8973	44	9252	23	1628	47
14	16	9178	92	1555	69	8789	47	9110	26	1515	46
15	.0919	10.8829	.1095	9.1309	.1272	7.8606	.1450	6.8969	.1629	6.1402	45
16	22	8483	98	1065	75	8424	53	8828	32	1290	44
17	25	8139	1101	0821	78	8243	56	8687	35	1178	43
18	28	7797	04	0579	81	8062	59	8548	38	1066	42
19	31	7457	07	0338	84	7882	62	8408	41	0955	41
20	.0934	10.7119	.1110	9.0098	.1287	7.7704	.1465	6.8269	.1644	6.0844	40
21	36	6783	13	8.9860	90	7525	68	8131	47	0734	39
22	39	6450	16	9623	93	7348	71	7994	50	0624	38
23	42	6118	19	9387	96	7171	74	7856	53	0514	37
24	45	5789	22	9152	99	6996	77	7720	55	0405	36
25	.0948	10.5462	.1125	8.8919	.1302	7.6821	.1480	6.7584	.1658	6.0296	35
26	51	5136	28	8686	05	6647	83	7448	61	0188	34
27	54	4813	31	8455	08	6473	86	7313	64	0080	33
28	57	4491	33	8225	11	6301	89	7179	67	5.9972	32
29	60	4172	36	7996	14	6129	92	7045	70	9865	31
30	.0963	10.3854	.1139	8.7769	.1317	7.5958	.1495	6.6912	.1673	5.9758	30
31	66	3538	42	7542	19	5787	97	6779	76	9651	29
32	69	3224	45	7317	22	5618	1500	6646	79	9545	28
33	72	2913	48	7093	25	5449	03	6514	82	9439	27
34	75	2602	51	6870	28	5281	06	6383	85	9333	26
35	.0978	10.2294	.1154	8.6648	.1331	7.5113	.1509	6.6252	.1688	5.9228	25
36	81	1988	57	6427	34	4947	12	6122	91	9124	24
37	83	1683	60	6208	37	4781	15	5992	94	9019	23
38	86	1381	63	5989	40	4615	18	5863	97	8915	22
39	89	1080	66	5772	43	4451	21	5734	1700	8811	21
40	.0992	10.0780	.1169	8.5555	.1346	7.4287	.1524	6.5606	.1703	5.8708	20
41	95	0483	72	5340	49	4124	27	5478	06	8605	19
42	98	0187	75	5126	52	3962	30	5350	09	8502	18
43	1001	9.9893	78	4913	55	3800	33	5223	12	8400	17
44	04	9601	81	4701	58	3639	36	5097	15	8298	16
45	.1007	9.9310	.1184	8.4490	.1361	7.3479	.1539	6.4971	.1718	5.8197	15
46	10	9021	87	4280	64	3319	42	4846	21	8095	14
47	13	8734	89	4071	67	3160	45	4721	24	7994	13
48	16	8448	92	3863	70	3002	48	4596	27	7894	12
49	19	8164	95	3656	73	2844	51	4472	30	7794	11
50	.1022	9.7882	.1198	8.3450	.1376	7.2687	.1554	6.4348	.1733	5.7694	10
51	25	7601	1201	3245	79	2531	57	4225	36	7594	9
52	28	7322	04	3041	82	2375	60	4103	39	7495	8
53	30	7044	07	2838	85	2220	63	3980	42	7396	7
54	33	6768	10	2636	88	2066	66	3859	45	7297	6
55	.1036	9.6493	.1213	8.2434	.1391	7.1912	.1569	6.3737	.1748	5.7199	5
56	39	6220	16	2234	94	1759	72	3617	51	7101	4
57	42	5949	19	2035	97	1607	75	3496	54	7004	3
58	45	5679	22	1837	99	1455	78	3376	57	6906	2
59	48	5411	25	1640	1402	1304	81	3257	60	6809	1
60	.1051	9.5144	.1228	8.1443	.1405	7.1154	.1584	6.3138	.1763	5.6713	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	84°		83°		82°		81°		80°		′

′	10°		11°		12°		13°		14°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.1763	5.6713	.1944	5.1446	.2126	4.7046	.2309	4.3315	.2493	4.0108	60
1	66	6617	47	1366	29	6979	12	3257	96	0058	59
2	69	6521	50	1286	32	6912	15	3200	99	0009	58
3	72	6425	53	1207	35	6845	18	3143	2503	3.9959	57
4	75	6329	56	1128	38	6779	21	3086	06	9910	56
5	.1778	5.6234	.1959	5.1049	.2141	4.6712	.2324	4.3029	.2509	3.9861	55
6	81	6140	62	0970	44	6646	27	2972	12	9812	54
7	84	6045	65	0892	47	6580	30	2916	15	9763	53
8	87	5951	68	0814	50	6514	33	2859	18	9714	52
9	90	5857	71	0736	53	6448	36	2803	21	9665	51
10	.1793	5.5764	.1974	5.0658	.2156	4.6382	.2339	4.2747	.2524	3.9617	50
11	96	5671	77	0581	59	6317	42	2691	27	9568	49
12	99	5578	80	0504	62	6252	45	2635	30	9520	48
13	1802	5485	83	0427	65	6187	49	2580	33	9471	47
14	05	5393	86	0350	68	6122	52	2524	37	9423	46
15	.1808	5.5301	.1989	5.0273	.2171	4.6057	.2355	4.2468	.2540	3.9375	45
16	11	5209	92	0197	74	5993	58	2413	43	9327	44
17	14	5118	95	0121	77	5928	61	2358	46	9279	43
18	17	5026	98	0045	80	5864	64	2303	49	9232	42
19	20	4936	2001	4.9969	83	5800	67	2248	52	9184	41
20	.1823	5.4845	.2004	4.9894	.2186	4.5736	.2370	4.2193	.2555	3.9136	40
21	26	4755	07	9819	89	5673	73	2139	58	9089	39
22	29	4665	10	9744	93	5609	76	2084	61	9042	38
23	32	4575	13	9669	96	5546	79	2030	64	8995	37
24	35	4486	16	9594	99	5483	82	1976	68	8947	36
25	.1838	5.4397	.2019	4.9520	.2202	4.5420	.2385	4.1922	.2571	3.8900	35
26	41	4308	22	9446	05	5357	88	1868	74	8854	34
27	44	4219	25	9372	08	5294	92	1814	77	8807	33
28	47	4131	28	9298	11	5232	95	1760	80	8760	32
29	50	4043	31	9225	14	5169	98	1706	83	8714	31
30	.1853	5.3955	.2035	4.9152	.2217	4.5107	.2401	4.1653	.2586	3.8667	30
31	56	3868	38	9078	20	5045	04	1600	89	8621	29
32	59	3781	41	9006	23	4983	07	1547	92	8575	28
33	62	3694	44	8933	26	4922	10	1493	95	8528	27
34	65	3607	47	8860	29	4860	13	1441	99	8482	26
35	.1868	5.3521	.2050	4.8788	.2232	4.4799	.2416	4.1388	.2602	3.8436	25
36	71	3435	53	8716	35	4737	19	1335	05	8391	24
37	74	3349	56	8644	38	4676	22	1282	08	8345	23
38	77	3263	59	8573	41	4615	25	1230	11	8299	22
39	80	3178	62	8501	44	4555	28	1178	14	8254	21
40	.1883	5.3093	.2065	4.8430	.2247	4.4494	.2432	4.1126	.2617	3.8208	20
41	87	3008	68	8359	51	4434	35	1074	20	8163	19
42	90	2924	71	8288	54	4373	38	1022	23	8118	18
43	93	2839	74	8218	57	4313	41	0970	27	8073	17
44	96	2755	77	8147	60	4253	44	0918	30	8028	16
45	.1899	5.2672	.2080	4.8077	.2263	4.4194	.2447	4.0867	.2633	3.7983	15
46	1902	2588	83	8007	66	4134	50	0815	36	7938	14
47	05	2505	86	7937	69	4075	53	0764	39	7893	13
48	08	2422	89	7867	72	4015	56	0713	42	7848	12
49	11	2339	92	7798	75	3956	59	0662	45	7804	11
50	.1914	5.2257	.2095	4.7729	.2278	4.3897	.2462	4.0611	.2648	3.7760	10
51	17	2174	98	7659	81	3838	65	0560	51	7715	9
52	20	2092	2101	7591	84	3779	69	0509	55	7671	8
53	23	2011	04	7522	87	3721	72	0459	58	7627	7
54	26	1929	07	7453	90	3662	75	0408	61	7583	6
55	.1929	5.1848	.2110	4.7385	.2293	4.3604	.2478	4.0358	.2664	3.7539	5
56	32	1767	13	7317	96	3546	81	0308	67	7495	4
57	35	1686	16	7249	99	3488	84	0257	70	7451	3
58	38	1606	19	7181	2303	3430	87	0207	73	7408	2
59	41	1526	23	7114	06	3372	90	0158	76	7364	1
60	.1944	5.1446	.2126	4.7046	.2309	4.3315	.2493	4.0108	.2679	3.7321	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	79°		78°		77°		76°		75°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

sin, cos 20°–29° .3420 .8660

sin, cos 30°–39° .5000 .7660

sin, cos 40°–44° .6428 .7071

sin, cos 45°–49° .6428 .7071

tan, cot 0°–4° .0000 11.43

tan, cot 85°–89° 11.43 .0000

tan, cot 5°–14° .0875 3.732

tan, cot 75°–84° 3.732 .0875

tan, cot 15°–24° .2679 2.144

tan, cot 65°–74° 2.144 .2679

′	15°		16°		17°		18°		19°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.2679	3.7321	.2867	3.4874	.3057	3.2709	.3249	3.0777	.3443	2.9042	60
1	83	7277	71	4836	60	2675	52	0746	47	9015	59
2	86	7234	74	4798	64	2641	56	0716	50	8987	58
3	89	7191	77	4760	67	2607	59	0686	53	8960	57
4	92	7148	80	4722	70	2573	62	0655	56	8933	56
5	.2695	3.7105	.2883	3.4684	.3073	3.2539	.3265	3.0625	.3460	2.8905	55
6	98	7062	86	4646	76	2506	69	0595	63	8878	54
7	2701	7019	90	4608	80	2472	72	0565	66	8851	53
8	04	6976	93	4570	83	2438	75	0535	69	8824	52
9	08	6933	96	4533	86	2405	78	0505	73	8797	51
10	.2711	3.6891	.2899	3.4495	.3089	3.2371	.3281	3.0475	.3476	2.8770	50
11	14	6848	2902	4458	92	2338	85	0445	79	8743	49
12	17	6806	05	4420	96	2305	88	0415	82	8716	48
13	20	6764	08	4383	99	2272	91	0385	86	8689	47
14	23	6722	12	4346	3102	2238	94	0356	89	8662	46
15	.2726	3.6680	.2915	3.4308	.3105	3.2205	.3298	3.0326	.3492	2.8636	45
16	29	6638	18	4271	08	2172	3301	0296	95	8609	44
17	33	6596	21	4234	11	2139	04	0267	99	8582	43
18	36	6554	24	4197	15	2106	07	0237	3502	8556	42
19	39	6512	27	4160	18	2073	10	0208	05	8529	41
20	.2742	3.6470	.2931	3.4124	.3121	3.2041	.3314	3.0178	.3508	2.8502	40
21	45	6429	34	4087	24	2008	17	0149	12	8476	39
22	48	6387	37	4050	27	1975	20	0120	15	8449	38
23	51	6346	40	4014	31	1943	23	0090	18	8423	37
24	54	6305	43	3977	34	1910	27	0061	22	8397	36
25	.2758	3.6264	.2946	3.3941	.3137	3.1878	.3330	3.0032	.3525	2.8370	35
26	61	6222	49	3904	40	1845	33	0003	28	8344	34
27	64	6181	53	3868	43	1813	36	2.9974	31	8318	33
28	67	6140	56	3832	47	1780	39	9945	35	8291	32
29	70	6100	59	3796	50	1748	43	9916	38	8265	31
30	.2773	3.6059	.2962	3.3759	.3153	3.1716	.3346	2.9887	.3541	2.8239	30
31	76	6018	65	3723	56	1684	49	9858	44	8213	29
32	80	5978	68	3687	59	1652	52	9829	48	8187	28
33	83	5937	72	3652	63	1620	56	9800	51	8161	27
34	86	5897	75	3616	66	1588	59	9772	54	8135	26
35	.2789	3.5856	.2978	3.3580	.3169	3.1556	.3362	2.9743	.3558	2.8109	25
36	92	5816	81	3544	72	1524	65	9714	61	8083	24
37	95	5776	84	3509	75	1492	69	9686	64	8057	23
38	98	5736	87	3473	79	1460	72	9657	67	8032	22
39	2801	5696	91	3438	82	1429	75	9629	71	8006	21
40	.2805	3.5656	.2994	3.3402	.3185	3.1397	.3378	2.9600	.3574	2.7980	20
41	08	5616	97	3367	88	1366	82	9572	77	7955	19
42	11	5576	3000	3332	91	1334	85	9544	81	7929	18
43	14	5536	03	3297	95	1303	88	9515	84	7903	17
44	17	5497	06	3261	98	1271	91	9487	87	7878	16
45	.2820	3.5457	.3010	3.3226	.3201	3.1240	.3395	2.9459	.3590	2.7852	15
46	23	5418	13	3191	04	1209	98	9431	94	7827	14
47	27	5379	16	3156	07	1178	3401	9403	97	7801	13
48	30	5339	19	3122	11	1146	04	9375	3600	7776	12
49	33	5300	22	3087	14	1115	08	9347	04	7751	11
50	.2836	3.5261	.3026	3.3052	.3217	3.1084	.3411	2.9319	.3607	2.7725	10
51	39	5222	29	3017	20	1053	14	9291	10	7700	9
52	42	5183	32	2983	23	1022	17	9263	13	7675	8
53	45	5144	35	2948	27	0991	21	9235	17	7650	7
54	49	5105	38	2914	30	0961	24	9208	20	7625	6
55	.2852	3.5067	.3041	3.2879	.3233	3.0930	.3427	2.9180	.3623	2.7600	5
56	55	5028	45	2845	36	0899	30	9152	27	7575	4
57	58	4989	48	2811	40	0868	34	9125	30	7550	3
58	61	4951	51	2777	43	0838	37	9097	33	7525	2
59	64	4912	54	2743	46	0807	40	9070	36	7500	1
60	.2867	3.4874	.3057	3.2709	.3249	3.0777	.3443	2.9042	.3640	2.7475	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	74°		73°		72°		71°		70°		′

′	20°		21°		22°		23°		24°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.3640	2.7475	.3839	2.6051	.4040	2.4751	.4245	2.3559	.4452	2.2460	60
1	43	7450	42	6028	44	4730	48	3539	56	2443	59
2	46	7425	45	6006	47	4709	52	3520	59	2425	58
3	50	7400	49	5983	50	4689	55	3501	63	2408	57
4	53	7376	52	5961	54	4668	58	3483	66	2390	56
5	.3656	2.7351	.3855	2.5938	.4057	2.4648	.4262	2.3464	.4470	2.2373	55
6	59	7326	59	5916	61	4627	65	3445	73	2355	54
7	63	7302	62	5893	64	4606	69	3426	77	2338	53
8	66	7277	65	5871	67	4586	72	3407	80	2320	52
9	69	7253	69	5848	71	4566	76	3388	84	2303	51
10	.3673	2.7228	.3872	2.5826	.4074	2.4545	.4279	2.3369	.4487	2.2286	50
11	76	7204	75	5804	78	4525	83	3351	91	2268	49
12	79	7179	79	5782	81	4504	86	3332	94	2251	48
13	83	7155	82	5759	84	4484	89	3313	98	2234	47
14	86	7130	85	5737	88	4464	93	3294	4501	2216	46
15	.3689	2.7106	.3889	2.5715	.4091	2.4443	.4296	2.3276	.4505	2.2199	45
16	93	7082	92	5693	95	4423	4300	3257	08	2182	44
17	96	7058	95	5671	98	4403	03	3238	12	2165	43
18	99	7034	99	5649	4101	4383	07	3220	15	2148	42
19	3702	7009	3902	5627	05	4362	10	3201	19	2130	41
20	.3706	2.6985	.3906	2.5605	.4108	2.4342	.4314	2.3183	.4522	2.2113	40
21	09	6961	09	5583	11	4322	17	3164	26	2096	39
22	12	6937	12	5561	15	4302	20	3146	29	2079	38
23	16	6913	16	5539	18	4282	24	3127	33	2062	37
24	19	6889	19	5517	22	4262	27	3109	36	2045	36
25	.3722	2.6865	.3922	2.5495	.4125	2.4242	.4331	2.3090	.4540	2.2028	35
26	26	6841	26	5473	29	4222	34	3072	43	2011	34
27	29	6818	29	5452	32	4202	38	3053	47	1994	33
28	32	6794	32	5430	35	4182	41	3035	50	1977	32
29	36	6770	36	5408	39	4162	45	3017	54	1960	31
30	.3739	2.6746	.3939	2.5386	.4142	2.4142	.4348	2.2998	.4557	2.1943	30
31	42	6723	42	5365	46	4122	52	2980	61	1926	29
32	45	6699	46	5343	49	4102	55	2962	64	1909	28
33	49	6675	49	5322	52	4083	59	2944	68	1892	27
34	52	6652	53	5300	56	4063	62	2925	71	1876	26
35	.3755	2.6628	.3956	2.5279	.4159	2.4043	.4365	2.2907	.4575	2.1859	25
36	59	6605	59	5257	63	4023	69	2889	78	1842	24
37	62	6581	63	5236	66	4004	72	2871	82	1825	23
38	65	6558	66	5214	69	3984	76	2853	85	1808	22
39	69	6534	69	5193	73	3964	79	2835	89	1792	21
40	.3772	2.6511	.3973	2.5172	.4176	2.3945	.4383	2.2817	.4592	2.1775	20
41	75	6488	76	5150	80	3925	86	2799	96	1758	19
42	79	6464	79	5129	83	3906	90	2781	99	1742	18
43	82	6441	83	5108	87	3886	93	2763	4603	1725	17
44	85	6418	86	5086	90	3867	97	2745	07	1708	16
45	.3789	2.6395	.3990	2.5065	.4193	2.3847	.4400	2.2727	.4610	2.1692	15
46	92	6371	93	5044	97	3828	04	2709	14	1675	14
47	95	6348	96	5023	4200	3808	07	2691	17	1659	13
48	99	6325	4000	5002	04	3789	11	2673	21	1642	12
49	3802	6302	03	4981	07	3770	14	2655	24	1625	11
50	.3805	2.6279	.4006	2.4960	.4210	2.3750	.4417	2.2637	.4628	2.1609	10
51	09	6256	10	4939	14	3731	21	2620	31	1592	9
52	12	6233	13	4918	17	3712	24	2602	35	1576	8
53	15	6210	17	4897	21	3693	28	2584	38	1560	7
54	19	6187	20	4876	24	3673	31	2566	42	1543	6
55	.3822	2.6165	.4023	2.4855	.4228	2.3654	.4435	2.2549	.4645	2.1527	5
56	25	6142	27	4834	31	3635	38	2531	49	1510	4
57	29	6119	30	4813	34	3616	42	2513	52	1494	3
58	32	6096	33	4792	38	3597	45	2496	56	1478	2
59	35	6074	37	4772	41	3578	49	2478	60	1461	1
60	.3839	2.6051	.4040	2.4751	.4245	2.3559	.4452	2.2460	.4663	2.1445	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	69°		68°		67°		66°		65°		′

sin, cos
0°–9°
.0000
.9848

sin, cos
10°–19°
.1736
.9397

sin, cos
20°–29°
.3420
.8660

sin, cos
30°–39°
.5000
.7660

sin, cos
40°–44°
.6428
.7071
45°–49°

tan, cot
0°–4°
.0000
11.43
85°–89°

tan, cot
5°–14°
.0875
3.732
75°–84°

tan, cot
15°–24°
.2679
2.144
65°–74°

tan, cot
25°–34°
.4663
1.428
55°–64°

′	25°		26°		27°		28°		29°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.4663	2.1445	.4877	2.0503	.5095	1.9626	.5317	1.8807	.5543	1.8040	60
1	67	1429	81	0488	99	9612	21	8794	47	8028	59
2	70	1413	85	0473	5103	9598	25	8781	51	8016	58
3	74	1396	88	0458	06	9584	28	8768	55	8003	57
4	77	1380	92	0443	10	9570	32	8755	58	7991	56
5	.4681	2.1364	.4895	2.0428	.5114	1.9556	.5336	1.8741	.5562	1.7979	55
6	84	1348	99	0413	17	9542	40	8728	66	7966	54
7	88	1332	4903	0398	21	9528	43	8715	70	7954	53
8	91	1315	06	0383	25	9514	47	8702	74	7942	52
9	95	1299	10	0368	28	9500	51	8689	77	7930	51
10	.4699	2.1283	.4913	2.0353	.5132	1.9486	.5354	1.8676	.5581	1.7917	50
11	4702	1267	17	0338	36	9472	58	8663	85	7905	49
12	06	1251	21	0323	39	9458	62	8650	89	7893	48
13	09	1235	24	0308	43	9444	66	8637	93	7881	47
14	13	1219	28	0293	47	9430	69	8624	96	7868	46
15	.4716	2.1203	.4931	2.0278	.5150	1.9416	.5373	1.8611	.5600	1.7856	45
16	20	1187	35	0263	54	9402	77	8598	04	7844	44
17	23	1171	39	0248	58	9388	81	8585	08	7832	43
18	27	1155	42	0233	61	9375	84	8572	12	7820	42
19	31	1139	46	0219	65	9361	88	8559	16	7808	41
20	.4734	2.1123	.4950	2.0204	.5169	1.9347	.5392	1.8546	.5619	1.7796	40
21	38	1107	53	0189	72	9333	96	8533	23	7783	39
22	41	1092	57	0174	76	9319	99	8520	27	7771	38
23	45	1076	60	0160	80	9306	5403	8507	31	7759	37
24	48	1060	64	0145	84	9292	07	8495	35	7747	36
25	.4752	2.1044	.4968	2.0130	.5187	1.9278	.5411	1.8482	.5639	1.7735	35
26	55	1028	71	0115	91	9265	15	8469	42	7723	34
27	59	1013	75	0101	95	9251	18	8456	46	7711	33
28	63	0997	79	0086	98	9237	22	8443	50	7699	32
29	66	0981	82	0072	5202	9223	26	8430	54	7687	31
30	.4770	2.0965	.4986	2.0057	.5206	1.9210	.5430	1.8418	.5658	1.7675	30
31	73	0950	89	0042	09	9196	33	8405	62	7663	29
32	77	0934	93	0028	13	9183	37	8392	65	7651	28
33	80	0918	97	0013	17	9169	41	8379	69	7639	27
34	84	0903	5000	1.9999	20	9155	45	8367	73	7627	26
35	.4788	2.0887	.5004	1.9984	.5224	1.9142	.5448	1.8354	.5677	1.7615	25
36	91	0872	08	9970	28	9128	52	8341	81	7603	24
37	95	0856	11	9955	32	9115	56	8329	85	7591	23
38	98	0840	15	9941	35	9101	60	8316	88	7579	22
39	4802	0825	19	9926	39	9088	64	8303	92	7567	21
40	.4806	2.0809	.5022	1.9912	.5243	1.9074	.5467	1.8291	.5696	1.7556	20
41	09	0794	26	9897	46	9061	71	8278	5700	7544	19
42	13	0778	29	9883	50	9047	75	8265	04	7532	18
43	16	0763	33	9868	54	9034	79	8253	08	7520	17
44	20	0748	37	9854	58	9020	82	8240	12	7508	16
45	.4823	2.0732	.5040	1.9840	.5261	1.9007	.5486	1.8228	.5715	1.7496	15
46	27	0717	44	9825	65	8993	90	8215	19	7485	14
47	31	0701	48	9811	69	8980	94	8202	23	7473	13
48	34	0686	51	9797	72	8967	98	8190	27	7461	12
49	38	0671	55	9782	76	8953	5501	8177	31	7449	11
50	.4841	2.0655	.5059	1.9768	.5280	1.8940	.5505	1.8165	.5735	1.7437	10
51	45	0640	62	9754	84	8927	09	8152	39	7426	9
52	49	0625	66	9740	87	8913	13	8140	43	7414	8
53	52	0609	70	9725	91	8900	17	8127	46	7402	7
54	56	0594	73	9711	95	8887	20	8115	50	7391	6
55	.4859	2.0579	.5077	1.9697	.5298	1.8873	.5524	1.8103	.5754	1.7379	5
56	63	0564	81	9683	5302	8860	28	8090	58	7367	4
57	67	0549	84	9669	06	8847	32	8078	62	7355	3
58	70	0533	88	9654	10	8834	35	8065	66	7344	2
59	74	0518	92	9640	13	8820	39	8053	70	7332	1
60	.4877	2.0503	.5095	1.9626	.5317	1.8807	.5543	1.8040	.5774	1.7321	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	64°		63°		62°		61°		60°		′

′	30°		31°		32°		33°		34°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.5774	1.7321	.6009	1.6643	.6249	1.6003	.6494	1.5399	.6745	1.4826	60
1	77	7309	13	6632	53	5993	98	5389	49	4816	59
2	81	7297	17	6621	57	5983	6502	5379	54	4807	58
3	85	7286	20	6610	61	5972	06	5369	58	4798	57
4	89	7274	24	6599	65	5962	11	5359	62	4788	56
5	.5793	1.7262	.6028	1.6588	.6269	1.5952	.6515	1.5350	.6766	1.4779	55
6	97	7251	32	6577	73	5941	19	5340	71	4770	54
7	5801	7239	36	6566	77	5931	23	5330	75	4761	53
8	05	7228	40	6555	81	5921	27	5320	79	4751	52
9	08	7216	44	6545	85	5911	31	5311	83	4742	51
10	.5812	1.7205	.6048	1.6534	.6289	1.5900	.6536	1.5301	.6787	1.4733	50
11	16	7193	52	6523	93	5890	40	5291	92	4724	49
12	20	7182	56	6512	97	5880	44	5282	96	4715	48
13	24	7170	60	6501	6301	5869	48	5272	6800	4705	47
14	28	7159	64	6490	05	5859	52	5262	05	4696	46
15	.5832	1.7147	.6068	1.6479	.6310	1.5849	.6556	1.5253	.6809	1.4687	45
16	36	7136	72	6469	14	5839	60	5243	13	4678	44
17	40	7124	76	6458	18	5829	65	5233	17	4669	43
18	44	7113	80	6447	22	5818	69	5224	22	4659	42
19	47	7102	84	6436	26	5808	73	5214	26	4650	41
20	.5851	1.7090	.6088	1.6426	.6330	1.5798	.6577	1.5204	.6830	1.4641	40
21	55	7079	92	6415	34	5788	81	5195	34	4632	39
22	59	7067	96	6404	38	5778	85	5185	39	4623	38
23	63	7056	6100	6393	42	5768	90	5175	43	4614	37
24	67	7045	04	6383	46	5757	94	5166	47	4605	36
25	.5871	1.7033	.6108	1.6372	.6350	1.5747	.6598	1.5156	.6851	1.4596	35
26	75	7022	12	6361	54	5737	6602	5147	56	4586	34
27	79	7011	16	6351	58	5727	06	5137	60	4577	33
28	83	6999	20	6340	63	5717	10	5127	64	4568	32
29	87	6988	24	6329	67	5707	15	5118	69	4559	31
30	.5890	1.6977	.6128	1.6319	.6371	1.5697	.6619	1.5108	.6873	1.4550	30
31	94	6965	32	6308	75	5687	23	5099	77	4541	29
32	98	6954	36	6297	79	5677	27	5089	81	4532	28
33	5902	6943	40	6287	83	5667	31	5080	86	4523	27
34	06	6932	44	6276	87	5657	36	5070	90	4514	26
35	.5910	1.6920	.6148	1.6265	.6391	1.5647	.6640	1.5061	.6894	1.4505	25
36	14	6909	52	6255	95	5637	44	5051	99	4496	24
37	18	6898	56	6244	99	5627	48	5042	6903	4487	23
38	22	6887	60	6234	6403	5617	52	5032	07	4478	22
39	26	6875	64	6223	08	5607	57	5023	11	4469	21
40	.5930	1.6864	.6168	1.6212	.6412	1.5597	.6661	1.5013	.6916	1.4460	20
41	34	6853	72	6202	16	5587	65	5004	20	4451	19
42	38	6842	76	6191	20	5577	69	4994	24	4442	18
43	42	6831	80	6181	24	5567	73	4985	29	4433	17
44	45	6820	84	6170	28	5557	78	4975	33	4424	16
45	.5949	1.6808	.6188	1.6160	.6432	1.5547	.6682	1.4966	.6937	1.4415	15
46	53	6797	92	6149	36	5537	86	4957	42	4406	14
47	57	6786	96	6139	40	5527	90	4947	46	4397	13
48	61	6775	6200	6128	45	5517	94	4938	50	4388	12
49	65	6764	04	6118	49	5507	99	4928	54	4379	11
50	.5969	1.6753	.6208	1.6107	.6453	1.5497	.6703	1.4919	.6959	1.4370	10
51	73	6742	12	6097	57	5487	07	4910	63	4361	9
52	77	6731	16	6087	61	5477	11	4900	67	4352	8
53	81	6720	20	6076	65	5468	15	4891	72	4344	7
54	85	6709	24	6066	69	5458	20	4882	76	4335	6
55	.5989	1.6698	.6228	1.6055	.6473	1.5448	.6724	1.4872	.6980	1.4326	5
56	93	6687	33	6045	78	5438	28	4863	85	4317	4
57	97	6676	37	6034	82	5428	32	4854	89	4308	3
58	6001	6665	41	6024	86	5418	37	4844	93	4299	2
59	05	6654	45	6014	90	5408	41	4835	98	4290	1
60	.6009	1.6643	.6249	1.6003	.6494	1.5399	.6745	1.4826	.7002	1.4281	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	59°		58°		57°		56°		55°		′

sin, cos 0°–9° .0000 .9848

sin, cos 10°–19° .1736 .9397

sin, cos 20°–29° .3420 .8660

sin, cos 30°–39° .5000 .7660

sin, cos 40°–44° .6428 .7071 45°–49°

tan, cot 0°–4° .0000 11.43 85°–89°

tan, cot 5°–14° .0875 3.732 75°–84°

tan, cot 15°–24° .2679 2.144 65°–74°

tan, cot 25°–34° .4663 1.428 55°–64°

tan, cot 35°–44° .7002 1.000 45°–54°

′	35°		36°		37°		38°		39°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.7002	1.4281	.7265	1.3764	.7536	1.3270	.7813	1.2799	.8098	1.2349	60
1	06	4273	70	3755	40	3262	18	2792	8103	2342	59
2	11	4264	74	3747	45	3254	22	2784	07	2334	58
3	15	4255	79	3739	49	3246	27	2776	12	2327	57
4	19	4246	83	3730	54	3238	32	2769	17	2320	56
5	.7024	1.4237	.7288	1.3722	.7558	1.3230	.7836	1.2761	.8122	1.2312	55
6	28	4229	92	3713	63	3222	41	2753	27	2305	54
7	32	4220	97	3705	68	3214	46	2746	32	2298	53
8	37	4211	7301	3697	72	3206	50	2738	36	2290	52
9	41	4202	06	3688	77	3198	55	2731	41	2283	51
10	.7046	1.4193	.7310	1.3680	.7581	1.3190	.7860	1.2723	.8146	1.2276	50
11	50	4185	14	3672	86	3182	65	2715	51	2268	49
12	54	4176	19	3663	90	3175	69	2708	56	2261	48
13	59	4167	23	3655	95	3167	74	2700	61	2254	47
14	63	4158	28	3647	7600	3159	79	2693	65	2247	46
15	.7067	1.4150	.7332	1.3638	.7604	1.3151	.7883	1.2685	.8170	1.2239	45
16	72	4141	37	3630	09	3143	88	2677	75	2232	44
17	76	4132	41	3622	13	3135	93	2670	80	2225	43
18	80	4124	46	3613	18	3127	98	2662	85	2218	42
19	85	4115	50	3605	23	3119	7902	2655	90	2210	41
20	.7089	1.4106	.7355	1.3597	.7627	1.3111	.7907	1.2647	.8195	1.2203	40
21	94	4097	59	3588	32	3103	12	2640	99	2196	39
22	98	4089	64	3580	36	3095	16	2632	8204	2189	38
23	7102	4080	68	3572	41	3087	21	2624	09	2181	37
24	07	4071	73	3564	46	3079	26	2617	14	2174	36
25	.7111	1.4063	.7377	1.3555	.7650	1.3072	.7931	1.2609	.8219	1.2167	35
26	15	4054	82	3547	55	3064	35	2602	24	2160	34
27	20	4045	86	3539	59	3056	40	2594	29	2153	33
28	24	4037	91	3531	64	3048	45	2587	34	2145	32
29	29	4028	95	3522	69	3040	50	2579	38	2138	31
30	.7133	1.4019	.7400	1.3514	.7673	1.3032	.7954	1.2572	.8243	1.2131	30
31	37	4011	04	3506	78	3024	59	2564	48	2124	29
32	42	4002	09	3498	83	3017	64	2557	53	2117	28
33	46	3994	13	3490	87	3009	69	2549	58	2109	27
34	51	3985	18	3481	92	3001	73	2542	63	2102	26
35	.7155	1.3976	.7422	1.3473	.7696	1.2993	.7978	1.2534	.8268	1.2095	25
36	59	3968	27	3465	7701	2985	83	2527	73	2088	24
37	64	3959	31	3457	06	2977	88	2519	78	2081	23
38	68	3951	36	3449	10	2970	92	2512	83	2074	22
39	73	3942	40	3440	15	2962	97	2504	87	2066	21
40	.7177	1.3934	.7445	1.3432	.7720	1.2954	.8002	1.2497	.8292	1.2059	20
41	81	3925	49	3424	24	2946	07	2489	97	2052	19
42	86	3916	54	3416	29	2938	12	2482	8302	2045	18
43	90	3908	58	3408	34	2931	16	2475	07	2038	17
44	95	3899	63	3400	38	2923	21	2467	12	2031	16
45	.7199	1.3891	.7467	1.3392	.7743	1.2915	.8026	1.2460	.8317	1.2024	15
46	7203	3882	72	3384	47	2907	31	2452	22	2017	14
47	08	3874	76	3375	52	2900	35	2445	27	2009	13
48	12	3865	81	3367	57	2892	40	2437	32	2002	12
49	17	3857	85	3359	61	2884	45	2430	37	1995	11
50	.7221	1.3848	.7490	1.3351	.7766	1.2876	.8050	1.2423	.8342	1.1988	10
51	26	3840	95	3343	71	2869	55	2415	46	1981	9
52	30	3831	99	3335	75	2861	59	2408	51	1974	8
53	34	3823	7504	3327	80	2853	64	2401	56	1967	7
54	39	3814	08	3319	85	2846	69	2393	61	1960	6
55	.7243	1.3806	.7513	1.3311	.7789	1.2838	.8074	1.2386	.8366	1.1953	5
56	48	3798	17	3303	94	2830	79	2378	71	1946	4
57	52	3789	22	3295	99	2822	83	2371	76	1939	3
58	57	3781	26	3287	7803	2815	88	2364	81	1932	2
59	61	3772	31	3278	08	2807	93	2356	86	1925	1
60	.7265	1.3764	.7536	1.3270	.7813	1.2799	.8098	1.2349	.8391	1.1918	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	54°		53°		52°		51°		50°		′

′	40°		41°		42°		43°		44°		′
	tan	cot	tan	cot	tan	cot	tan	cot	tan	cot	
0	.8391	1.1918	.8693	1.1504	.9004	1.1106	.9325	1.0724	.9657	1.0355	60
1	96	1910	98	1497	09	1100	31	0717	63	0349	59
2	8401	1903	8703	1490	15	1093	36	0711	68	0343	58
3	06	1896	08	1483	20	1087	41	0705	74	0337	57
4	11	1889	13	1477	25	1080	47	0699	79	0331	56
5	.8416	1.1882	.8718	1.1470	.9030	1.1074	.9352	1.0692	.9685	1.0325	55
6	21	1875	24	1463	36	1067	58	0686	91	0319	54
7	26	1868	29	1456	41	1061	63	0680	96	0313	53
8	31	1861	34	1450	46	1054	69	0674	9702	0307	52
9	36	1854	39	1443	52	1048	74	0668	08	0301	51
10	.8441	1.1847	.8744	1.1436	.9057	1.1041	.9380	1.0661	.9713	1.0295	50
11	46	1840	49	1430	62	1035	85	0655	19	0289	49
12	51	1833	54	1423	67	1028	91	0649	25	0283	48
13	56	1826	59	1416	73	1022	96	0643	30	0277	47
14	61	1819	65	1410	78	1016	9402	0637	36	0271	46
15	.8466	1.1812	.8770	1.1403	.9083	1.1009	.9407	1.0630	.9742	1.0265	45
16	71	1806	75	1396	89	1003	13	0624	47	0259	44
17	76	1799	80	1389	94	0996	18	0618	53	0253	43
18	81	1792	85	1383	99	0990	24	0612	59	0247	42
19	86	1785	90	1376	9105	0983	29	0606	64	0241	41
20	.8491	1.1778	.8796	1.1369	.9110	1.0977	.9435	1.0599	.9770	1.0235	40
21	96	1771	8801	1363	15	0971	40	0593	76	0230	39
22	8501	1764	06	1356	21	0964	46	0587	81	0224	38
23	06	1757	11	1349	26	0958	51	0581	87	0218	37
24	11	1750	16	1343	31	0951	57	0575	93	0212	36
25	.8516	1.1743	.8821	1.1336	.9137	1.0945	.9462	1.0569	.9798	1.0206	35
26	21	1736	27	1329	42	0939	68	0562	9804	0200	34
27	26	1729	32	1323	47	0932	73	0556	10	0194	33
28	31	1722	37	1316	53	0926	79	0550	16	0188	32
29	36	1715	42	1310	58	0919	84	0544	21	0182	31
30	.8541	1.1708	.8847	1.1303	.9163	1.0913	.9490	1.0538	.9827	1.0176	30
31	46	1702	52	1296	69	0907	95	0532	33	0170	29
32	51	1695	58	1290	74	0900	9501	0526	38	0164	28
33	56	1688	63	1283	79	0894	06	0519	44	0158	27
34	61	1681	68	1276	85	0888	12	0513	50	0152	26
35	.8566	1.1674	.8873	1.1270	.9190	1.0881	.9517	1.0507	.9856	1.0147	25
36	71	1667	78	1263	95	0875	23	0501	61	0141	24
37	76	1660	84	1257	9201	0869	28	0495	67	0135	23
38	81	1653	89	1250	06	0862	34	0489	73	0129	22
39	86	1647	94	1243	12	0856	40	0483	79	0123	21
40	.8591	1.1640	.8899	1.1237	.9217	1.0850	.9545	1.0477	.9884	1.0117	20
41	96	1633	8904	1230	22	0843	51	0470	90	0111	19
42	8601	1626	10	1224	28	0837	56	0464	96	0105	18
43	06	1619	15	1217	33	0831	62	0458	9902	0099	17
44	11	1612	20	1211	39	0824	67	0452	07	0094	16
45	.8617	1.1606	.8925	1.1204	.9244	1.0818	.9573	1.0446	.9913	1.0088	15
46	22	1599	31	1197	49	0812	78	0440	19	0082	14
47	27	1592	36	1191	55	0805	84	0434	25	0076	13
48	32	1585	41	1184	60	0799	90	0428	30	0070	12
49	37	1578	46	1178	66	0793	95	0422	36	0064	11
50	.8642	1.1571	.8952	1.1171	.9271	1.0786	.9601	1.0416	.9942	1.0058	10
51	47	1565	57	1165	76	0780	06	0410	48	0052	9
52	52	1558	62	1158	82	0774	12	0404	54	0047	8
53	57	1551	67	1152	87	0768	18	0398	59	0041	7
54	62	1544	72	1145	93	0761	23	0392	65	0035	6
55	.8667	1.1538	.8978	1.1139	.9298	1.0755	.9629	1.0385	.9971	1.0029	5
56	72	1531	83	1132	9303	0749	34	0379	77	0023	4
57	78	1524	88	1126	09	0742	40	0373	83	0017	3
58	83	1517	94	1119	14	0736	46	0367	88	0012	2
59	88	1510	99	1113	20	0730	51	0361	94	0006	1
60	.8693	1.1504	.9004	1.1106	.9325	1.0724	.9657	1.0355	.1000	1.0000	0
	cot	tan	cot	tan	cot	tan	cot	tan	cot	tan	
′	49°		48°		47°		46°		45°		′

TABLE VI

THE LOGARITHMS S AND T

The angle α'' being less than 7275″

FORMULAS FOR THE USE OF S AND T

When the angle A is less than 2°,

let $\alpha =$ the number of seconds in the angle A;

then $S = \log \sin \alpha'' - \log \alpha$,

$T = \log \tan \alpha'' - \log \alpha$,

$\log \cot \alpha'' = -\log \tan \alpha''$.

When the angle A is between 88° and 90°,

let $\alpha'' = 90° - A$;

then $\log \cos A = \log \alpha + S$,

$\log \cot A = \log \alpha + T$,

$\log \tan A = -\log \tan \alpha''$.

The angle $A < 2°$ or $> 88°$,

when $\log \sin A$ or $\log \cos A < \bar{2}.54282$ or $> \bar{1}.99974$,

or when $\log \tan A$ or $\log \cot A < \bar{2}.54308$ or > 1.45692.

α	S	log sin α″	α	T	log tan α″	α	T	log tan α″
0			0			5 146		$\bar{2}.39\,713$
	$\bar{6}.68\,557$			$\bar{6}.68\,557$			$\bar{6}.68\,567$	
2 409		$\bar{2}.06\,740$	200		$\bar{4}.98\,660$	5 424		$\bar{2}.41\,999$
	$\bar{6}.68\,556$			$\bar{6}.68\,558$			$\bar{6}.68\,568$	
3 417		$\bar{2}.21\,920$	1 726		$\bar{3}.92\,263$	5 689		$\bar{2}.44\,072$
	$\bar{6}.68\,555$			$\bar{6}.68\,559$			$\bar{6}.68\,569$	
3 823		$\bar{2}.26\,795$	2 432		$\bar{2}.07\,156$	5 941		$\bar{2}.45\,955$
	$\bar{6}.68\,554$			$\bar{6}.68\,560$			$\bar{6}.68\,570$	
4 190		$\bar{2}.30\,776$	2 976		$\bar{2}.15\,924$	6 184		$\bar{2}.47\,697$
	$\bar{6}.68\,554$			$\bar{6}.68\,561$			$\bar{6}.68\,571$	
4 840		$\bar{2}.37\,038$	3 434		$\bar{2}.22\,142$	6 417		$\bar{2}.49\,305$
	$\bar{6}.68\,553$			$\bar{6}.68\,562$			$\bar{6}.68\,572$	
5 414		$\bar{2}.41\,904$	3 838		$\bar{2}.26\,973$	6 642		$\bar{2}.50\,802$
	$\bar{6}.68\,552$			$\bar{6}.68\,563$			$\bar{6}.68\,573$	
5 932		$\bar{2}.45\,872$	4 204		$\bar{2}.30\,930$	6 859		$\bar{2}.52\,200$
	$\bar{6}.68\,551$			$\bar{6}.68\,564$			$\bar{6}.68\,574$	
6 408		$\bar{2}.49\,223$	4 540		$\bar{2}.34\,270$	7 070		$\bar{2}.53\,516$
	$\bar{6}.68\,550$			$\bar{6}.68\,565$			$\bar{6}.68\,575$	
6 633		$\bar{2}.50\,721$	4 699		$\bar{2}.35\,766$	7 173		$\bar{2}.54\,145$
	$\bar{6}.68\,550$			$\bar{6}.68\,565$			$\bar{6}.68\,575$	
6 851		$\bar{2}.52\,125$	4 853		$\bar{2}.37\,167$	7 274		$\bar{2}.54\,753$
	$\bar{6}.68\,549$			$\bar{6}.68\,566$				
7 267		$\bar{2}.54\,684$	5 146		$\bar{2}.39\,713$			
α	S	log sin α″	α	T	log tan α″	α	T	log tan α″

ANNOUNCEMENTS

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